

Family name:

First name:

Matr.no.:

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For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[3]{a^5 b^2} \sqrt{a^6 b^3 c}}{(a^3 b^4)^{\frac{5}{3}} \sqrt[5]{b^5 c^2}}$.

Answer: A $\frac{1}{a^{3/2} b^{29/12}}$ B $a^{9/5} \sqrt[15]{b^6 c}$ C $\frac{1}{a^{12/5} b^{39/10} \sqrt{c}}$ D $\frac{1}{a^{3/2} b^{5/2} \sqrt[20]{c}}$ E $\frac{a^{5/3} \sqrt[10]{c}}{b^{17/6}}$ → **E**

2) Compute all solutions of the system

$$\begin{cases} -2x + 5y + 2 = x + 2y \\ y - 3x = -2x - 2y. \end{cases}$$

Answer: A $x = -\frac{2}{3}$ and $y = -\frac{1}{3}$ B $x = -\frac{3}{4}$ and $y = -1$ C $x = -\frac{6}{5}$ and $y = \frac{14}{5}$ D $x = 1$ and $y = \frac{1}{3}$ E $x = \frac{2}{5}$ and $y = -\frac{8}{15}$ → **D**

3) Compute all solutions of the inequality $-|x+1| - x + 1 \leq 2x^2$.

Answer: A $x \leq 0$ or $x \geq 2$ B $x \leq -1$ or $x \geq 0$ C $x \leq \frac{1}{2}(-3 - \sqrt{5})$ or $x \geq \frac{1}{2}(1 + \sqrt{13})$ D $\frac{1}{2}(-1 - \sqrt{5}) \leq x \leq \frac{1}{2}(3 + \sqrt{29})$ E $x \geq -1$ → **B**

4) Compute all solutions of the system of inequalities

$$\begin{cases} x^2 - x - 2 < x^2 \\ x \geq |1 - 2x| + 1. \end{cases}$$

Answer: A $\frac{1}{3} \leq x < \frac{2}{3}$ B No x C $x > 1$ or $x \leq 0$ D $\frac{1}{8}(-3 - \sqrt{41}) < x \leq 0$ E $\frac{1}{8}(-1 - \sqrt{33}) < x \leq 0$ → **B**

5) Find the domain of definition of the expression: $\log\left(\frac{(1+x)(4+x)}{2+2x}\right)$.

Answer: A $x > -4$ B $x < \frac{1}{2}$ or $x > 2$ C $x < -\frac{3}{2}$ or $-\frac{1}{4} < x < 1$ D $x < -3$ or $-2 < x < 1$ E $x < -3$ or $0 < x < 1$ → **A**

6) Find all x such that $\frac{-1-2x}{(4+x)(1+3x)} > 0$.

Answer: A $-2 < x < 0$ or $x > \frac{3}{2}$ B $x < \frac{1}{2}$ C $-\frac{3}{2} < x < \frac{1}{3}$ or $x > \frac{4}{3}$ D $\frac{1}{3} < x < 3$ E $x < -4$ or $-\frac{1}{2} < x < -\frac{1}{3}$ → **E**

7) Compute the limit $\lim_{x \rightarrow +\infty} e^x - \frac{e^{2x}}{x}$.

Answer: A $-\infty$ B 2 C -1 D $-e$ E 1 F Does not exist → **A**

8) Compute the limit $\lim_{x \rightarrow 0^-} \frac{e^{2/x}(1-x)}{3x+2}$.

Answer: A -1 B 1 C $-\pi$ D e E Does not exist F 0 → **F**

9) Compute the limit $\lim_{x \rightarrow +\infty} -\frac{1}{x^4} - x - \log(x)$.

Answer: A $-\pi$ B $-\infty$ C $-e$ D Does not exist E 2 F 0 → **B**

10) Compute the limit $\lim_{x \rightarrow -\infty} \frac{-4x^3 + 3x^2 + 1}{-2x^3 + x^2 + 1}$.

Answer: A Does not exist B $\frac{1}{2}$ C $+\infty$ D 2 E -1 F $\frac{3}{2}$ → **D**

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For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[3]{a^3b^3}\sqrt[4]{a^6b^2c}}{(a^3b^3)\sqrt[3]{bc^4}}$.

Answer: A $\frac{1}{a^2b^{5/4}}$ B $\frac{a^{2/3}\sqrt[10]{c}}{b^{8/3}}$ C $\frac{1}{\sqrt{ab^{11/6}c^{13/12}}}$ D $\frac{a^{11/3}}{bc^{4/3}}$ E $\frac{\sqrt{a}}{b^{7/10}c^{3/10}}$ → **C**

2) Compute all solutions of the system

$$\begin{cases} -5x + 5y + 2 = 2y - 2x \\ x + y = 4x - y. \end{cases}$$

Answer: A $x = -\frac{4}{3}$ and $y = -2$ B $x = -3$ and $y = -7$ C $x = \frac{2}{11}$ and $y = \frac{8}{33}$ D $x = -\frac{1}{6}$ and $y = \frac{1}{2}$ → **A**
 E $x = -\frac{2}{7}$ and $y = \frac{8}{7}$

3) Compute all solutions of the inequality $3x^2 < 1 - x + |x + 3|$.

Answer: A $-1 < x < -\frac{1}{2}$ or $-\frac{1}{2} < x < 1$ B $-\frac{1}{4} < x < 1$ C $-\frac{2}{3} < x < 0$ D $\frac{1}{2}(1 - \sqrt{7}) < x < \frac{1}{2}(1 + \sqrt{7})$ → **E**
 E $-\frac{2}{\sqrt{3}} < x < \frac{2}{\sqrt{3}}$

4) Compute all solutions of the system of inequalities

$$\begin{cases} x - 2 \leq x^2 - x \\ 2x - 3 > |-2x - 1|. \end{cases}$$

Answer: A $-\frac{1}{4} < x \leq \frac{1}{2}(\sqrt{5} - 1)$ B $x > -\frac{1}{4}$ C $\sqrt{6} - 2 \leq x < 2$ D $-\frac{2}{3} < x < 0$ E No x → **E**

5) Find the domain of definition of the expression: $\sqrt{\frac{(2+x)(4+x)}{1+3x}}$.

Answer: A $-4 \leq x \leq -\frac{1}{2}$ or $x > 2$ B $x \leq -2$ or $1 < x \leq \frac{3}{2}$ C $-3 \leq x \leq -1$ or $x > 0$ → **D**
 D $-4 \leq x \leq -2$ or $x > -\frac{1}{3}$ E $-4 \leq x < -1$ or $x \geq \frac{2}{3}$

6) Find all x such that $\frac{-3 - 2x}{(3 + 3x)(-1 + 3x)} \leq 0$.

Answer: A $x < -\frac{4}{3}$ or $\frac{1}{3} < x \leq \frac{3}{2}$ B $x \leq -3$ or $-\frac{1}{3} < x < 4$ C $-3 \leq x < 0$ or $x > 5$ → **E**
 D $x < -5$ or $\frac{1}{3} < x \leq 3$ E $-\frac{3}{2} \leq x < -1$ or $x > \frac{1}{3}$

7) Compute the limit $\lim_{x \rightarrow -\infty} e^{-x} - e^{3x}x^2$.

Answer: A 2 B $+\infty$ C $-\pi$ D Does not exist E e F $-e$ → **B**

8) Compute the limit $\lim_{x \rightarrow 0^-} \frac{e^{-2/x}}{x^2 + x + 1}$.

Answer: A 1 B Does not exist C π D $+\infty$ E 2 F e → **D**

9) Compute the limit $\lim_{x \rightarrow 0^+} 3x - \frac{1}{x} - \log(x)$.

Answer: A 1 B π C $-e$ D Does not exist E -1 F $-\infty$ → **F**

10) Compute the limit $\lim_{x \rightarrow +\infty} \frac{2x^2 - x + 1}{x^2 - 4x^3}$.

Answer: A $-\infty$ B $-\frac{3}{2}$ C $\frac{1}{2}$ D 1 E Does not exist F 0 → **F**

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For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{(a^3b^4) \sqrt[6]{a^6b^3c^2}}{(a^3b^2) \sqrt[4]{b^5c^6}}$.

Answer: A $\frac{a^4 \sqrt[4]{b}}{c^{3/4}}$ B $\frac{a^4}{b^{11/6}}$ C $\frac{a^4}{b^{19/12} \sqrt{c}}$ D $\frac{\sqrt{c}}{a^{2/5} b^{7/4}}$ E $\frac{ab^{5/4}}{c^{7/6}}$ → **E**

2) Compute all solutions of the system

$$\begin{cases} -2x - y + 2 = x + 2y \\ -3x - 2y = x + y. \end{cases}$$

Answer: A $x = -2$ and $y = \frac{8}{3}$ B $x = -\frac{1}{3}$ and $y = -\frac{1}{2}$ C $x = \frac{1}{24}$ and $y = -\frac{7}{24}$ D $x = \frac{1}{7}$ and $y = \frac{1}{2}$ → **A**
 E $y = \frac{x}{2} + \frac{1}{3}$

3) Compute all solutions of the inequality $2x^2 < 1 - x + |2x + 2|$.

Answer: A $-2 < x < -1$ or $-1 < x < 2$ B $\frac{1}{4}(1 - \sqrt{17}) < x < \frac{1}{4}(1 + \sqrt{17})$ C $-1 < x < \frac{3}{2}$ → **C**
 D $\frac{1}{8}(-3 - \sqrt{57}) < x < \frac{1}{8}(1 + \sqrt{17})$ E $-1 - \sqrt{3} < x < \sqrt{3} - 1$

4) Compute all solutions of the system of inequalities

$$\begin{cases} -x - 2 \leq x^2 + 3x \\ 2x + 1 > |x - 1|. \end{cases}$$

Answer: A $\sqrt{3} - 1 \leq x < 1$ B $x \geq 1 + \sqrt{3}$ C $-\frac{1}{2} < x \leq 1$ D $x > 0$ E $1 - \sqrt{2} \leq x \leq 1 + \sqrt{2}$ → **D**

5) Find the domain of definition of the expression: $\sqrt{\frac{(2+x)(3-3x)}{-2-x}}$.

Answer: A $x \geq 1$ B $-\frac{1}{3} \leq x < 1$ or $x \geq 2$ C $-4 \leq x \leq -1$ or $x > 2$ D $-1 < x \leq \frac{1}{3}$ or $x \geq \frac{2}{3}$ E $x \leq \frac{1}{2}$ → **A**

6) Find all x such that $\frac{1-x}{(4+x)(-2+3x)} > 0$.

Answer: A $x < \frac{1}{3}$ or $x > \frac{2}{3}$ B $-\frac{3}{2} < x < 0$ or $x > 4$ C $x < -4$ or $0 < x < \frac{3}{2}$ D $x < -3$ or $\frac{2}{3} < x < 2$ → **E**
 E $x < -4$ or $\frac{2}{3} < x < 1$

7) Compute the limit $\lim_{x \rightarrow +\infty} \frac{e^{-3x}}{x^2} - e^{2x}x$.

Answer: A 1 B π C -1 D 2 E $-\infty$ F Does not exist → **E**

8) Compute the limit $\lim_{x \rightarrow 0^-} \frac{e^{2/x}(2x+1)}{-x-1}$.

Answer: A -1 B e C 0 D Does not exist E $-\pi$ F 2 → **C**

9) Compute the limit $\lim_{x \rightarrow 0^+} \frac{3}{x^4} + x - \log(x)$.

Answer: A $-\pi$ B Does not exist C $+\infty$ D 2 E $-\infty$ F $-e$ → **C**

10) Compute the limit $\lim_{x \rightarrow -\infty} \frac{4x^3 + 3x^2 + x + 1}{x^2 - 4x^3}$.

Answer: A Does not exist B -1 C $-\frac{1}{2}$ D $-\pi$ E 0 F -3 → **B**

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For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[5]{a^7 b^3} \sqrt{a^6 b^4 c^3}}{(a^2 b^4)^{\frac{4}{3}} \sqrt[4]{b^5 c^2}}$.

Answer: A $\frac{a^{12/5} c}{b^{53/20}}$

B $\frac{\sqrt[15]{b}}{a^{7/6} \sqrt[20]{c}}$

C $\frac{a^{2/3} \sqrt[10]{c}}{b^{8/3}}$

D $\frac{1}{\sqrt{ab^{107/30} c^{3/2}}}$

E $\frac{a^4}{b^{8/3} c}$

→ **A**

2) Compute all solutions of the system

$$\begin{cases} 4x + 5y + 2 = 2y - 2x \\ x + y = 4x - 2y. \end{cases}$$

Answer: A $x = -\frac{2}{11}$ and $y = -\frac{8}{11}$ B $x = -\frac{2}{9}$ and $y = -\frac{2}{9}$ C $x = 2$ and $y = 1$ D $x = \frac{2}{15}$ and $y = \frac{7}{15}$

E $x = \frac{1}{13}$ and $y = \frac{4}{13}$

→ **B**

3) Compute all solutions of the inequality $-3|x - 3| + x - 3 \leq -x^2$.

Answer: A $-2 \leq x \leq 2$ B $x \geq -9$ C $x \leq \frac{1}{2}(-3 - \sqrt{13})$ or $x \geq \frac{1}{2}(\sqrt{13} - 3)$ D $-6 \leq x \leq 2$ E $x \leq -1$

→ **D**

4) Compute all solutions of the system of inequalities

$$\begin{cases} |x - 1| > 2x - 2 \\ 2x > -3x^2 - 2x + 2. \end{cases}$$

Answer: A $x < -\frac{1}{3}$ or $0 < x < 3$

B $x < -\frac{1}{3}$ or $0 < x < \frac{2}{3}$

C $-1 < x < 0$ or $x > 0$

D $x < \frac{1}{3}(-2 - \sqrt{10})$ or $\frac{1}{3}(\sqrt{10} - 2) < x < 1$

E $2 - \sqrt{3} < x < 2$

→ **D**

5) Find the domain of definition of the expression: $\log(-4x^2 + 3x - 3)$.

Answer: A No x B $\frac{1}{8}(1 - \sqrt{17}) < x < \frac{1}{8}(1 + \sqrt{17})$ C $x < -1$ or $x > -\frac{1}{3}$ D $x > \frac{1}{2}$ E $-\frac{3}{2} < x < 0$

→ **A**

6) Find all x such that $\frac{-3 + x}{(4 - x)(-2 + 3x)} > 0$.

Answer: A $x < \frac{2}{3}$ or $3 < x < 4$ B $x < -3$ or $-\frac{1}{2} < x < 0$ C $x < -\frac{2}{3}$ or $x > 1$ D $\frac{1}{3} < x < 1$ or $x > 2$

E $-4 < x < -\frac{3}{2}$ or $x > -\frac{2}{3}$

→ **A**

7) Compute the limit $\lim_{x \rightarrow +\infty} e^{3x} - e^{2x} x^3$.

Answer: A $+\infty$

B $-e$

C 1

D $-\pi$

E Does not exist

F 0

→ **A**

8) Compute the limit $\lim_{x \rightarrow \frac{1}{3}^-} \frac{e^{3/x}}{1 - 3x}$.

Answer: A -1

B $-\infty$

C π

D $-\pi$

E $+\infty$

F Does not exist

→ **E**

9) Compute the limit $\lim_{x \rightarrow +\infty} x - \frac{1}{x} + \log(x)$.

Answer: A $+\infty$

B -1

C π

D $-\infty$

E 2

F Does not exist

→ **A**

10) Compute the limit $\lim_{x \rightarrow +\infty} \frac{3x^2 + 1}{x^2 - 4x^3}$.

Answer: A 0

B 1

C Does not exist

D 2

E $-e$

F $-\pi$

→ **A**

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For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{(a^7b^4)\sqrt[4]{a^6b^3c}}{(a^3b^4)\sqrt[3]{b^5c^6}}$.

Answer: A $\frac{a^{11/2}}{b^{11/12}c^{7/4}}$ B $\frac{b^{31/20}\sqrt[10]{c}}{\sqrt{a}}$ C $\frac{a^{5/3}b^{4/3}}{c^{7/15}}$ D $\frac{\sqrt{c}}{a^{12/5}b^{59/20}}$ E $\frac{a^{2/3}}{b^{13/12}\sqrt[3]{c}}$ → **A**

2) Compute all solutions of the system

$$\begin{cases} x + 2y + 2 = y - 2x \\ y - 3x = x - 2y. \end{cases}$$

Answer: A $x = -\frac{6}{13}$ and $y = -\frac{8}{13}$ B $x = \frac{3}{11}$ and $y = -\frac{4}{11}$ C $x = \frac{4}{5}$ and $y = -\frac{2}{5}$ D $x = \frac{1}{3}$ and $y = -1$ E $x = \frac{3}{10}$ and $y = \frac{2}{5}$ → **A**

3) Compute all solutions of the inequality $-3|x - 3| - x - 3 \leq 2x^2$.

Answer: A All \mathbf{R} B $x \leq -\frac{7}{2}$ or $x \geq 1$ C $x \geq \frac{1}{2}$ D $x \leq -1$ or $x \geq 1$ E $\frac{1}{2}(3 - \sqrt{5}) \leq x \leq \frac{1}{2}(3 + \sqrt{5})$ → **A**

4) Compute all solutions of the system of inequalities

$$\begin{cases} x + 2 \leq x^2 + 3x \\ 2x - 3 > |x + 1|. \end{cases}$$

Answer: A $x > 4$ B $2 < x \leq 1 + \sqrt{2}$ C $-\frac{1}{2} < x \leq \frac{1}{2}(\sqrt{5} - 1)$ D $-\frac{1}{4} < x \leq \frac{1}{2}(1 + \sqrt{5})$ E $x \geq 1 + \sqrt{3}$ → **A**

5) Find the domain of definition of the expression: $\log\left(\frac{(-3 + 2x)(3 + 2x)}{-1 + 2x}\right)$.

Answer: A $x < -1$ or $-1 < x < \frac{1}{4}$ B $-\frac{3}{2} < x < \frac{1}{2}$ or $x > \frac{3}{2}$ C $-3 < x < 0$ or $x > \frac{1}{2}$ D $x < 0$ or $1 < x < 3$ E $-\frac{1}{4} < x < 0$ or $x > 2$ → **B**

6) Find all x such that $\frac{-3 + 2x}{(3 - x)(2 + 3x)} > 0$.

Answer: A $x < -\frac{2}{3}$ or $\frac{3}{2} < x < 3$ B $x < -\frac{3}{2}$ or $-\frac{1}{3} < x < 2$ C $\frac{2}{3} < x < 3$ or $x > 4$ D $x < -\frac{1}{3}$ or $x > 2$ E $\frac{1}{2} < x < \frac{2}{3}$ or $x > 4$ → **A**

7) Compute the limit $\lim_{x \rightarrow -\infty} e^{2x}x^3 - \frac{e^{3x}}{x^2}$.

Answer: A π B $-\infty$ C $+\infty$ D Does not exist E $-\pi$ F 0 → **F**

8) Compute the limit $\lim_{x \rightarrow +\infty} \frac{e^{2/x}(2x - 2)}{3x + 2}$.

Answer: A π B $-\pi$ C 2 D $\frac{2}{3}$ E 1 F Does not exist → **D**

9) Compute the limit $\lim_{x \rightarrow 0^+} -x + \frac{1}{x} - 3 \log(x)$.

Answer: A Does not exist B $-\pi$ C $-e$ D 1 E 2 F $+\infty$ → **F**

10) Compute the limit $\lim_{x \rightarrow +\infty} \frac{-2x^3 + x^2 + 1}{2x^3 + x^2 + 1}$.

Answer: A $\frac{1}{2}$ B Does not exist C 3 D -1 E $-e$ F $+\infty$ → **D**

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For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{(a^9b^4) \sqrt[4]{a^4b^4c^2}}{(a^4b^2) \sqrt[5]{b^3c^6}}$.

Answer: A $\frac{\sqrt{c}}{b^{7/4}}$ B $\frac{\sqrt{a}}{b^{7/10}c^{3/10}}$ C $\frac{a^{7/15}}{b^{49/15}c^{7/10}}$ D $\frac{a^6b^{12/5}}{c^{7/10}}$ E $a^{11/2}\sqrt{b}\sqrt[3]{c}$ → **D**

2) Compute all solutions of the system

$$\begin{cases} -2x - 4y - 2 = x + 2y \\ x + y = -2x - y. \end{cases}$$

Answer: A $x = \frac{1}{3}$ and $y = \frac{1}{6}$ B $x = \frac{1}{2}$ and $y = \frac{7}{2}$ C $x = \frac{1}{3}$ and $y = -\frac{1}{2}$ D $y = \frac{x}{2} - \frac{1}{3}$ → **C**
 E $x = -2$ and $y = -1$

3) Compute all solutions of the inequality $2x^2 + |x - 2| \geq x$.

Answer: A $x \leq -4$ or $x \geq \frac{4}{3}$ B $x \geq 4$ C All \mathbf{R} D $\frac{1}{4}(1 - \sqrt{33}) \leq x \leq \frac{1}{4}(1 + \sqrt{33})$ E $\frac{1}{4}(1 - \sqrt{33}) \leq x \leq \frac{5}{2}$ → **C**

4) Compute all solutions of the system of inequalities

$$\begin{cases} |x + 1| > 2x + 1 \\ x > -3x^2 - 2x + 2. \end{cases}$$

Answer: A $-3 < x < -1$ or $x > -\frac{1}{3}$ B $x < \frac{1}{6}(-3 - \sqrt{33})$ C $x < 0$ or $0 < x < 3$ D No x → **B**
 E $x > 1$ or $x \leq 0$

5) Find the domain of definition of the expression: $\sqrt{\frac{(1-2x)(3-3x)}{-2-x}}$.

Answer: A $-1 \leq x < \frac{1}{3}$ or $x \geq \frac{4}{3}$ B $x \leq -1$ C $x \leq -2$ or $-\frac{2}{3} < x \leq \frac{1}{3}$ D $x \leq -\frac{3}{2}$ or $1 < x \leq 4$ → **E**
 E $x < -2$ or $\frac{1}{2} \leq x \leq 1$

6) Find all x such that $\frac{(1+2x)(4+x)}{3x} \geq 0$.

Answer: A $x < -\frac{1}{3}$ or $\frac{2}{3} \leq x \leq 3$ B $x < \frac{2}{3}$ or $\frac{4}{3} \leq x \leq \frac{3}{2}$ C $-2 \leq x < \frac{1}{3}$ D $x < 0$ or $x \geq 1$ → **E**
 E $-4 \leq x \leq -\frac{1}{2}$ or $x > 0$

7) Compute the limit $\lim_{x \rightarrow -\infty} e^{-x}x^2 - \frac{e^{3x}}{x^3}$.

Answer: A $+\infty$ B 2 C -1 D Does not exist E 0 F 1 → **A**

8) Compute the limit $\lim_{x \rightarrow 0^-} \frac{e^{-2/x}(2x-2)}{-x-1}$.

Answer: A -1 B $-\pi$ C π D Does not exist E $-\infty$ F $+\infty$ → **F**

9) Compute the limit $\lim_{x \rightarrow 0^+} -x - \frac{3}{x} - \log(x)$.

Answer: A $-\infty$ B Does not exist C e D $+\infty$ E π F -1 → **A**

10) Compute the limit $\lim_{x \rightarrow +\infty} \frac{-4x^3 + x^2 - 2x + 1}{x^2 - 4x^3}$.

Answer: A Does not exist B π C 0 D -1 E 1 F e → **E**

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1) Simplify the following expression: $\frac{\sqrt[3]{a^7 b^4} \sqrt[6]{a^4 b^4 c^3}}{(a^4 b^4) \sqrt[5]{bc^4}}$.

Answer: A $\frac{\sqrt[3]{c}}{\sqrt[6]{ab^{19/12}}}$ B $\frac{a^{7/5} c^{4/3}}{b^{3/2}}$ C $\frac{1}{ab^{11/5} c^{3/10}}$ D $\frac{1}{\sqrt[3]{ab^{11/6} c^{3/2}}}$ E $\frac{c^{3/5}}{\sqrt[6]{ab^{53/30}}}$ → C

2) Compute all solutions of the system

$$\begin{cases} 4x - 4y - 2 = 2y - 2x \\ x - 2y = 4x - y. \end{cases}$$

Answer: A $x = \frac{2}{15}$ and $y = \frac{2}{5}$ B $x = -\frac{3}{5}$ and $y = -\frac{4}{5}$ C $x = \frac{1}{12}$ and $y = -\frac{1}{4}$ D $x = \frac{6}{5}$ and $y = \frac{2}{5}$ E $x = -\frac{4}{7}$ and $y = 2$ → C

3) Compute all solutions of the inequality $-2x^2 + |x + 2| \geq -x - 4$.

Answer: A $\frac{1}{2}(1 - \sqrt{13}) \leq x \leq \frac{1}{2}(1 + \sqrt{13})$ B $x \geq -\frac{4}{5}$ C $x \leq -4$ or $x \geq 0$ D $\frac{1}{4}(-3 - \sqrt{41}) \leq x \leq \frac{1}{4}(1 + \sqrt{33})$ E $\frac{1}{4}(-1 - \sqrt{33}) \leq x \leq \frac{1}{4}(\sqrt{33} - 1)$ → A

4) Compute all solutions of the system of inequalities

$$\begin{cases} |x + 3| > 2x - 2 \\ 2x > x^2 + x. \end{cases}$$

Answer: A $x < -1$ or $\frac{2}{3} < x < 1$ B $-3 < x < \frac{1}{3}(-2 - \sqrt{10})$ or $x > \frac{1}{3}(\sqrt{10} - 2)$ C $x < -\sqrt{\frac{2}{3}}$ or $\sqrt{\frac{2}{3}} < x < 1$ D $\frac{1}{2}(1 - \sqrt{5}) < x < 0$ E $0 < x < 1$ → E

5) Find the domain of definition of the expression: $\log\left(\frac{(-3+x)(2-2x)}{-1-x}\right)$.

Answer: A $-\frac{1}{2} < x < 2$ or $x > 3$ B $x < -1$ or $0 < x < 4$ C $x < -2$ or $-\frac{1}{2} < x < \frac{3}{2}$ D $x < -3$ or $0 < x < \frac{1}{2}$ E $-1 < x < 1$ or $x > 3$ → E

6) Find all x such that $\frac{-1+2x}{(3+x)(-2+3x)} \leq 0$.

Answer: A $x < -4$ or $\frac{2}{3} < x \leq 3$ B $x < -3$ or $\frac{1}{2} \leq x < \frac{2}{3}$ C $x < \frac{1}{3}$ or $1 \leq x < 4$ D $x < -5$ or $-1 \leq x < \frac{1}{3}$ E $x < -\frac{2}{3}$ or $x > 5$ → B

7) Compute the limit $\lim_{x \rightarrow -\infty} e^{-2x} - e^{3x}x$.

Answer: A $+\infty$ B Does not exist C $-\pi$ D 0 E $-e$ F 2 → A

8) Compute the limit $\lim_{x \rightarrow 0^+} \frac{e^{-2/x}(2x+1)}{x-1}$.

Answer: A Does not exist B 2 C $-e$ D $-\pi$ E 0 F e → E

9) Compute the limit $\lim_{x \rightarrow +\infty} \frac{5}{x^4} + x - \log(x)$.

Answer: A Does not exist B 0 C $-e$ D $+\infty$ E π F 1 → D

10) Compute the limit $\lim_{x \rightarrow +\infty} \frac{-4x^3 + 3x^2 - x + 1}{2x^3 + x^2 + 1}$.

Answer: A Does not exist B $+\infty$ C -1 D -2 E $\frac{3}{2}$ F $-e$ → D

Family name:

First name:

Matr.no.:

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{(a^7b^2)^6 \sqrt[6]{a^6b^4c^2}}{(a^3b^3)^4 \sqrt[4]{b^3c^4}}$.

Answer: A $\frac{10\sqrt{a}}{b^{19/6}c^{3/2}}$

B $\frac{a^5}{b^{13/12}c^{2/3}}$

C $\frac{a^{4/3}}{b}$

D $\frac{a^4 \sqrt[4]{b}}{c^{3/4}}$

E $\frac{a^{20/3}}{b^{5/12} \sqrt[3]{c}}$

→ **B**

2) Compute all solutions of the system

$$\begin{cases} -5x - 4y - 2 = y - 2x \\ -3x - 2y = 2y - 2x. \end{cases}$$

Answer: A $x = -\frac{1}{12}$ and $y = \frac{1}{3}$

B $x = \frac{1}{7}$ and $y = \frac{4}{7}$

C $x = -\frac{8}{7}$ and $y = \frac{2}{7}$

D $x = \frac{2}{5}$ and $y = -\frac{4}{5}$

E $x = -\frac{2}{21}$ and $y = \frac{1}{3}$

→ **C**

3) Compute all solutions of the inequality $-3|x-1| + x - 1 \leq 2x^2$.

Answer: A All \mathbf{R}

B $-\sqrt{2} \leq x \leq 3 + \sqrt{5}$

C $x \leq -1 - \sqrt{2}$ or $x \geq \sqrt{2} - 1$

D $-1 - \sqrt{5} \leq x \leq 2 + \sqrt{2}$

E $\frac{1}{2}(1 - \sqrt{21}) \leq x \leq \frac{1}{2}(5 + \sqrt{29})$

→ **A**

4) Compute all solutions of the system of inequalities

$$\begin{cases} |3-x| - 2x \leq -2 \\ x^2 + x + 1 > 1 - 3x. \end{cases}$$

Answer: A $3 \leq x < 4$

B $x \geq \frac{5}{3}$

C $-3 < x \leq -\frac{5}{3}$

D $\frac{2}{3} \leq x < 1$

E No x

→ **B**

5) Find the domain of definition of the expression: $\log\left(\frac{(-4+2x)(2-x)}{-1-4x}\right)$.

Answer: A $x < -\frac{3}{2}$ or $2 < x < 4$

B $x < -\frac{1}{2}$ or $1 < x < 3$

C $-\frac{1}{4} < x < 2$ or $x > 2$

D $x < \frac{1}{2}$ or $\frac{3}{2} < x < 4$

E $-1 < x < 2$ or $x > 4$

→ **C**

6) Find all x such that $\frac{(-1+x)(4-x)}{-1+3x} \geq 0$.

Answer: A $-1 \leq x < -\frac{1}{3}$ or $x \geq 3$

B $x < \frac{1}{3}$ or $1 \leq x \leq 4$

C e

D $x \leq -2$ or $\frac{1}{3} < x \leq \frac{1}{2}$

E $-2 \leq x < -\frac{1}{3}$ or $x \geq 3$

→ **B**

7) Compute the limit $\lim_{x \rightarrow -\infty} \frac{e^{-3x}}{x} - e^{2x}x$.

Answer: A Does not exist

B $+\infty$

C $-\pi$

D 2

E π

F $-\infty$

→ **F**

8) Compute the limit $\lim_{x \rightarrow -\infty} \frac{e^{-2/x}(1-x)}{x+2}$.

Answer: A -1

B π

C 2

D $\frac{2}{3}$

E 1

F Does not exist

→ **A**

9) Compute the limit $\lim_{x \rightarrow 0^+} -\frac{1}{x^4} - x + \log(x)$.

Answer: A $-e$

B Does not exist

C 0

D $-\pi$

E $+\infty$

F $-\infty$

→ **F**

10) Compute the limit $\lim_{x \rightarrow -\infty} \frac{-2x^3 + 3x^2 - 3x + 1}{4x^3 + x^2}$.

Answer: A $-e$

B Does not exist

C 1

D $-\frac{1}{2}$

E $\frac{1}{2}$

F $-\frac{3}{2}$

→ **D**

Family name: _____ First name: _____ Matr.no.: _____

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[5]{a^9 b^2} \sqrt[6]{a^6 b^3 c^4}}{(a^2 b^2) \sqrt[5]{b c^4}}$.

Answer: A $\frac{1}{a^{3/5} b^{5/4} c^{11/20}}$ B $\frac{a^{4/3} c}{b^{29/12}}$ C $\frac{a^{4/5}}{b^{13/10} c^{2/15}}$ D $\frac{a^9 b^{15/4}}{\sqrt{c}}$ E $\frac{b^{13/10}}{c^{3/10}}$ → **C**

2) Compute all solutions of the system

$$\begin{cases} -5x - y - 2 = x + y \\ x + y = -2x - 2y. \end{cases}$$

Answer: A $x = 0$ and $y = -\frac{1}{2}$ B $x = -\frac{6}{5}$ and $y = \frac{8}{5}$ C $x = -\frac{4}{13}$ and $y = \frac{2}{13}$ D $x = -\frac{1}{3}$ and $y = -\frac{1}{3}$ E $x = -\frac{1}{2}$ and $y = \frac{1}{2}$ → **E**

3) Compute all solutions of the inequality $-2x^2 + |-x - 2| \geq -3x - 2$.

Answer: A $x \leq \frac{1}{4}(-1 - \sqrt{33})$ or $x \geq \frac{1}{4}(\sqrt{33} - 1)$ B $x \leq -\sqrt{2}$ or $x \geq 1$ C $1 - \sqrt{3} \leq x \leq 1 + \sqrt{3}$ D $x \leq 0$ or $x \geq 4$ E $x \geq -3$ → **C**

4) Compute all solutions of the system of inequalities

$$\begin{cases} |3 - x| + 2x \leq 1 \\ x^2 - 2x + 1 > 1 - 3x. \end{cases}$$

Answer: A $x \leq -2$ B $x \geq \frac{2}{3}$ C $2 \leq x < 4$ D $0 < x < 1$ E $3 \leq x < 4$ → **A**

5) Find the domain of definition of the expression: $\log\left(\frac{(-3 + 2x)(3 - x)}{2x}\right)$.

Answer: A $-1 < x < 1$ or $x > 3$ B $x < 1$ or $x > 4$ C $x < -1$ or $3 < x < 4$ D $1 < x < 2$ or $x > 2$ E $x < 0$ or $\frac{3}{2} < x < 3$ → **E**

6) Find all x such that $\frac{-3 + 2x}{(2 - 3x)(3x)} > 0$.

Answer: A $x < \frac{2}{3}$ or $3 < x < 4$ B $-1 < x < -\frac{2}{3}$ or $x > 1$ C $-4 < x < 0$ or $x > 1$ D $x < -3$ or $0 < x < \frac{3}{2}$ E $x < 0$ or $\frac{2}{3} < x < \frac{3}{2}$ → **E**

7) Compute the limit $\lim_{x \rightarrow +\infty} e^{-2x} - \frac{e^{-x}}{x}$.

Answer: A Does not exist B $+\infty$ C -1 D π E 0 F $-\pi$ → **E**

8) Compute the limit $\lim_{x \rightarrow 0^-} \frac{e^{\frac{1}{x}}}{-x^2 + x + 1}$.

Answer: A Does not exist B π C -1 D $-e$ E 0 F 2 → **E**

9) Compute the limit $\lim_{x \rightarrow +\infty} x^2 - 3x + \log(x)$.

Answer: A 1 B Does not exist C π D -1 E $-\pi$ F $+\infty$ → **F**

10) Compute the limit $\lim_{x \rightarrow -\infty} \frac{-4x^3 + x^2 - 2x + 1}{-4x^3 + x^2 + 1}$.

Answer: A -2 B $-e$ C $-\frac{1}{2}$ D 1 E $-\infty$ F Does not exist → **D**

Family name: _____ First name: _____ Matr.no.: _____

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[5]{a^9 b^4} \sqrt[6]{a^2 b^2 c^4}}{(a^3 b^4) \sqrt[5]{b^5 c^4}}$.

Answer: A $\frac{a^{23/3} b^{7/12}}{c^{4/3}}$ B $\frac{1}{a^{13/15} b^{58/15} c^{2/15}}$ C $\frac{1}{a^{9/10} b^{19/10} c^{3/2}}$ D $\frac{1}{a^{8/15} b^{41/12} c^{5/6}}$ E $\frac{a}{b^{2/3} \sqrt[3]{c}}$ → **B**

2) Compute all solutions of the system

$$\begin{cases} -5x + 5y - 2 = x + y \\ -3x - 2y = 4x + 2y. \end{cases}$$

Answer: A $x = -\frac{2}{13}$ and $y = \frac{7}{26}$ B $x = -\frac{2}{7}$ and $y = -\frac{2}{7}$ C $x = \frac{1}{5}$ and $y = -\frac{7}{15}$ D $y = \frac{1}{3} - \frac{x}{2}$ → **A**
 E $y = \frac{3x}{2} + \frac{1}{2}$

3) Compute all solutions of the inequality $2|x+1| - 3x - 1 \leq 2x^2$.

Answer: A $\frac{1}{2}(-3 - \sqrt{13}) \leq x \leq \frac{1}{2}(1 + \sqrt{21})$ B $\frac{1}{2}(-1 - \sqrt{5}) \leq x \leq \frac{1}{2}(3 + \sqrt{29})$ C 1 D $x \leq -\frac{3}{2}$ or $x = -1$ or $x \geq \frac{1}{2}$ → **D**
 E $\frac{1}{2}(5 - \sqrt{37}) \leq x \leq \frac{1}{2}(5 + \sqrt{37})$

4) Compute all solutions of the system of inequalities

$$\begin{cases} |1-x| > -2x-2 \\ x > x^2+x. \end{cases}$$

Answer: A $x < -\frac{1}{3}$ B No x C $x < 0$ D $x < -1$ or $-\frac{1}{3} < x < 1$ E $-1 < x < -\frac{1}{\sqrt{3}}$ or $x > \frac{1}{\sqrt{3}}$ → **B**

5) Find the domain of definition of the expression: $\log\left(\frac{(1-x)(4+2x)}{-1-x}\right)$.

Answer: A $-2 < x < -1$ or $x > 1$ B $-\frac{1}{2} < x < \frac{3}{2}$ or $x > 4$ C $x < -4$ or $-2 < x < 0$ → **A**
 D $-3 < x < 0$ or $x > 3$ E $-2 < x < \frac{1}{2}$ or $x > 3$

6) Find all x such that $\frac{(-5-3x)(3-x)}{3x} < 0$.

Answer: A $x < -\frac{5}{3}$ or $0 < x < 3$ B $-2 < x < -\frac{2}{3}$ or $x > -\frac{1}{2}$ C $x < -1$ or $\frac{2}{3} < x < 1$ D $x < \frac{1}{3}$ → **A**
 E $x < -2$ or $\frac{1}{3} < x < \frac{3}{2}$

7) Compute the limit $\lim_{x \rightarrow +\infty} e^{3x} - \frac{e^{3x}}{x^2}$.

Answer: A 0 B -1 C Does not exist D $-\infty$ E $-e$ F $+\infty$ → **F**

8) Compute the limit $\lim_{x \rightarrow 0^+} e^{-3/x} (2x - x^2)$.

Answer: A -1 B $-\pi$ C 0 D $+\infty$ E e F Does not exist → **C**

9) Compute the limit $\lim_{x \rightarrow 0^+} x^2 + 3x - \log(x)$.

Answer: A $-e$ B -1 C $+\infty$ D Does not exist E 0 F e → **C**

10) Compute the limit $\lim_{x \rightarrow -\infty} \frac{4x^3 + 2x^2 + 1}{x^2 - 4x^3}$.

Answer: A $\frac{3}{2}$ B $-\frac{3}{2}$ C $-\infty$ D Does not exist E 1 F -1 → **F**

Family name: _____ First name: _____ Matr.no.: _____

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[5]{a^3b^2}\sqrt[6]{a^6b^3c}}{(a^2b^4)^{\frac{5}{6}}\sqrt[5]{bc^6}}$.

Answer: A $\frac{1}{a^{2/5}b^{33/10}c^{31/30}}$ B $\frac{1}{b^{37/12}c^{5/6}}$ C $\frac{1}{a^{3/2}b^{2/3}c^{7/4}}$ D $\frac{a^{3/2}}{b^{15/4}\sqrt{c}}$ E $\frac{1}{b^{23/12}}$ → **A**

2) Compute all solutions of the system

$$\begin{cases} 4x + 2y + 2 = y - 2x \\ x + y = 4x - y. \end{cases}$$

Answer: A $x = \frac{6}{53}$ and $y = -\frac{14}{53}$ B $x = -2$ and $y = -\frac{14}{3}$ C $x = -1$ and $y = -1$ D $x = \frac{1}{9}$ and $y = \frac{1}{3}$ E $x = -\frac{4}{15}$ and $y = -\frac{2}{5}$ → **E**

3) Compute all solutions of the inequality $2|x - 1| + x - 1 \leq x^2$.

Answer: A $x \leq \frac{1}{2}$ or $x \geq 2$ B $\frac{1}{2}(-1 - \sqrt{13}) \leq x \leq \frac{1}{2}(\sqrt{13} - 1)$ C $x \leq 2$ D $x \leq \frac{1}{2}(-1 - \sqrt{5})$ or $x \geq \frac{1}{2}(\sqrt{5} - 1)$ E $1 - \sqrt{5} \leq x \leq 2 + \sqrt{6}$ → **D**

4) Compute all solutions of the system of inequalities

$$\begin{cases} |-x - 1| + 2x \leq 1 \\ -x^2 + x + 2 > x + 2. \end{cases}$$

Answer: A $3 \leq x < 4$ B $x \leq 0$ C No x D $x > 0$ E $\frac{2}{3} \leq x < 1$ → **C**

5) Find the domain of definition of the expression: $\sqrt{\frac{(1+x)(4+x)}{1-x}}$.

Answer: A $-2 \leq x < -1$ or $x \geq 2$ B $-\frac{2}{3} < x \leq 2$ or $x \geq 4$ C $x \leq -2$ or $-1 < x \leq \frac{3}{2}$ D $x \leq -4$ or $-1 \leq x < 1$ E $x < 0$ or $x = 2$ → **D**

6) Find all x such that $\frac{(-1+x)(2-3x)}{1+3x} < 0$.

Answer: A $x < -4$ or $-\frac{1}{3} < x < \frac{1}{2}$ B $-4 < x < -\frac{2}{3}$ C $-\frac{1}{2} < x < \frac{1}{3}$ or $x > 2$ D $-\frac{1}{3} < x < \frac{2}{3}$ or $x > 1$ E $x < -\frac{1}{3}$ or $\frac{1}{3} < x < 1$ → **D**

7) Compute the limit $\lim_{x \rightarrow -\infty} \frac{e^{-3x}}{x^2} - e^{2x}x^2$.

Answer: A π B $-\pi$ C $+\infty$ D Does not exist E $-\infty$ F -1 → **C**

8) Compute the limit $\lim_{x \rightarrow -\frac{1}{5}^-} \frac{e^{-3/x}}{-5x - 1}$.

Answer: A Does not exist B 2 C $-e$ D 0 E π F $+\infty$ → **F**

9) Compute the limit $\lim_{x \rightarrow +\infty} 5x^2 - x + \log(x)$.

Answer: A -1 B 0 C $-\pi$ D $+\infty$ E Does not exist F $-\infty$ → **D**

10) Compute the limit $\lim_{x \rightarrow -\infty} \frac{2x^3 + 3x^2 + x + 1}{-4x^3 + x^2 + 1}$.

Answer: A 2 B $-\frac{1}{2}$ C π D $-\frac{3}{2}$ E Does not exist F $-\infty$ → **B**

Family name: _____ First name: _____ Matr.no.: _____

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[5]{a^5 b^4} \sqrt[4]{a^4 b^2 c^2}}{(a^2 b^3) \sqrt[3]{b^3 c^6}}$.

Answer: A $\frac{c^{3/5}}{\sqrt[6]{ab^{53}/30}}$ B $\frac{c^{2/3}}{b^{2/3}}$ C $\frac{a^{2/3} \sqrt[10]{c}}{b^{8/3}}$ D $\frac{1}{b^{27/10} c^{3/2}}$ E $\frac{\sqrt[10]{a}}{b^{19/6} c^{3/2}}$ → **D**

2) Compute all solutions of the system

$$\begin{cases} 4x + 5y - 2 = 2y - 2x \\ -3x - 2y = -2x - y. \end{cases}$$

Answer: A $x = -8$ and $y = 2$ B $x = -6$ and $y = 2$ C $x = -\frac{4}{15}$ and $y = -\frac{14}{15}$ D $x = \frac{4}{5}$ and $y = \frac{2}{5}$ E $x = \frac{2}{3}$ and $y = -\frac{2}{3}$ → **E**

3) Compute all solutions of the inequality $2|x+1| - x - 1 \leq 3x^2$.

Answer: A $-3 \leq x \leq -\frac{1}{3}$ B $x \leq \frac{1}{6}(1 - \sqrt{37})$ or $x \geq \frac{1}{6}(1 + \sqrt{37})$ C $x \geq -\frac{1}{2}$ D $x \geq 0$ E $x \leq \frac{1}{6}(1 - \sqrt{13})$ or $x \geq \frac{1}{6}(1 + \sqrt{13})$ → **E**

4) Compute all solutions of the system of inequalities

$$\begin{cases} |x+3| + 2x \leq -2 \\ x^2 - 2x + 1 > 1 - 3x. \end{cases}$$

Answer: A No x B $-3 < x \leq -\frac{2}{3}$ C $x \geq \frac{5}{3}$ D $-3 < x \leq -\frac{5}{3}$ E $x \leq -\frac{5}{3}$ → **E**

5) Find the domain of definition of the expression: $\sqrt{\frac{(1+x)(4+x)}{1+3x}}$.

Answer: A $-1 \leq x < -\frac{2}{3}$ or $x \geq 2$ B $-4 \leq x \leq -1$ or $x > -\frac{1}{3}$ C $-2 < x \leq \frac{4}{3}$ or $x \geq \frac{3}{2}$ D $-2 \leq x \leq -1$ or $x > 1$ E $-\frac{1}{2} \leq x < 2$ or $x \geq 3$ → **B**

6) Find all x such that $\frac{-3-2x}{(2+x)(-2+3x)} > 0$.

Answer: A $x < -4$ or $-1 < x < -\frac{1}{3}$ B $-\frac{3}{2} < x < 0$ or $x > \frac{2}{3}$ C $x < -2$ or $-\frac{3}{2} < x < \frac{2}{3}$ D $x < -\frac{1}{2}$ or $-\frac{1}{3} < x < 4$ E $x < -\frac{2}{3}$ or $-\frac{1}{2} < x < \frac{4}{3}$ → **C**

7) Compute the limit $\lim_{x \rightarrow +\infty} e^{3x} - e^{-x} x^3$.

Answer: A 2 B Does not exist C $-\infty$ D $-e$ E $+\infty$ F $-\pi$ → **E**

8) Compute the limit $\lim_{x \rightarrow -\frac{3}{5}^+} \frac{e^{3/x}}{-5x-3}$.

Answer: A e B $-\pi$ C $-\infty$ D Does not exist E π F 1 → **C**

9) Compute the limit $\lim_{x \rightarrow 0^+} 5x^2 + 3x - \log(x)$.

Answer: A 1 B -1 C π D Does not exist E $+\infty$ F $-e$ → **E**

10) Compute the limit $\lim_{x \rightarrow -\infty} \frac{4x^3 + 2x^2 + x + 1}{2x^3 + x^2 + 1}$.

Answer: A $+\infty$ B 2 C Does not exist D 3 E $-\infty$ F -1 → **B**

Family name: _____ First name: _____ Matr.no.: _____

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[5]{a^7 b^4} \sqrt[4]{a^4 b^2 c^4}}{(a^2 b^2) \sqrt[3]{b^5 c^6}}$.

Answer: A $\frac{a^{4/3}}{b}$ B $a^7 c^{4/3}$ C $\frac{a^{2/5}}{b^{71/30} c}$ D $\frac{a^{7/2}}{b^{5/4} c^{3/4}}$ E $\frac{a^{13/2} b^{3/4}}{\sqrt{c}}$ → **C**

2) Compute all solutions of the system

$$\begin{cases} -5x - y - 2 = 2y - 2x \\ x - 2y = 4x - y. \end{cases}$$

Answer: A $x = -\frac{4}{9}$ and $y = -\frac{14}{9}$ B $x = -\frac{4}{21}$ and $y = \frac{2}{7}$ C $x = \frac{2}{3}$ D $x = \frac{1}{3}$ and $y = -1$ → **D**
 E $x = \frac{2}{11}$ and $y = -\frac{14}{33}$

3) Compute all solutions of the inequality $2|x+1| - x - 3 \leq -x^2$.

Answer: A 2 B $x \leq -\frac{1}{2}$ or $x \geq 1$ C $x \leq 1 - \sqrt{3}$ or $x \geq 1 + \sqrt{3}$ D $\frac{1}{2}(5 - \sqrt{29}) \leq x \leq \frac{1}{2}(5 + \sqrt{29})$ → **E**
 E $\frac{1}{2}(3 - \sqrt{29}) \leq x \leq \frac{1}{2}(\sqrt{5} - 1)$

4) Compute all solutions of the system of inequalities

$$\begin{cases} |-x - 1| > 2x - 2 \\ 2x > x^2 + x - 2. \end{cases}$$

Answer: A $-1 < x < 2$ B $\frac{1}{2}(3 - \sqrt{17}) < x < 3$ C $x < -\frac{1}{\sqrt{3}}$ or $\frac{1}{\sqrt{3}} < x < 2$ D $x < -\frac{1}{3}$ or $0 < x < \frac{2}{3}$ → **A**
 E $-5 < x < 0$ or $x > 0$

5) Find the domain of definition of the expression: $\sqrt{\frac{(2+2x)(4-3x)}{1-x}}$.

Answer: A $x < -2$ or $\frac{2}{3} \leq x \leq \frac{3}{2}$ B $x < 0$ or $\frac{4}{3} \leq x \leq 2$ C $-1 \leq x < -\frac{2}{3}$ or $x \geq 2$ → **D**
 D $-1 \leq x < 1$ or $x \geq \frac{4}{3}$ E $x \leq -4$ or $-1 \leq x < 0$

6) Find all x such that $\frac{(-1-x)(4-3x)}{1+3x} \geq 0$.

Answer: A $x \leq -\frac{3}{2}$ or $-\frac{2}{3} < x \leq \frac{4}{3}$ B $-1 \leq x < -\frac{1}{3}$ or $x \geq \frac{4}{3}$ C $x \leq -\frac{3}{2}$ or $\frac{1}{3} < x \leq 3$ → **B**
 D $-\frac{1}{3} < x \leq \frac{4}{3}$ or $x \geq 3$ E $x \leq 1$

7) Compute the limit $\lim_{x \rightarrow -\infty} e^x - e^{2x} x$.

Answer: A $-\pi$ B $+\infty$ C Does not exist D π E e F 0 → **F**

8) Compute the limit $\lim_{x \rightarrow 0^+} \frac{e^{2/x}(2x-2)}{2-x}$.

Answer: A $+\infty$ B e C $-\infty$ D Does not exist E $-\pi$ F 0 → **C**

9) Compute the limit $\lim_{x \rightarrow 0^+} -x + \frac{5}{x} - \log(x)$.

Answer: A π B 2 C $-\infty$ D $+\infty$ E -1 F Does not exist → **D**

10) Compute the limit $\lim_{x \rightarrow +\infty} \frac{2x^3 + 2x^2 - x + 1}{4x^3 + x^2}$.

Answer: A 1 B 0 C Does not exist D -3 E $-\infty$ F $\frac{1}{2}$ → **F**

Family name: _____ First name: _____ Matr.no.: _____

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{(a^5 b^3) \sqrt[6]{a^6 b^4 c^3}}{(a^2 b^4) \sqrt[4]{b^5 c^4}}$.

Answer: A $\frac{a^4}{b^{19/12} \sqrt[12]{c}}$ B $\frac{1}{a^{11/10} b^{37/10} c^{3/10}}$ C $\frac{\sqrt[12]{c}}{b}$ D $\frac{1}{b^{23/12}}$ E $\frac{\sqrt[12]{c}}{\sqrt[5]{ab^9/20}}$ → **A**

2) Compute all solutions of the system

$$\begin{cases} x + 5y + 2 = y - 2x \\ x - 2y = 2y - 2x. \end{cases}$$

Answer: A $x = \frac{6}{25}$ and $y = \frac{14}{25}$ B $y = -2x - \frac{2}{3}$ C $x = \frac{2}{3}$ and $y = 1$ D $x = -\frac{1}{3}$ and $y = \frac{1}{9}$ E $x = -\frac{1}{3}$ and $y = -\frac{1}{4}$ → **E**

3) Compute all solutions of the inequality $-3|x - 3| + x - 1 \leq x^2$.

Answer: A -1 B $x \geq -3$ C All \mathbf{R} D $x \leq -2 - \sqrt{6}$ or $x \geq \sqrt{6} - 2$ E $x \leq -1 - \sqrt{3}$ or $x \geq \sqrt{3} - 1$ → **C**

4) Compute all solutions of the system of inequalities

$$\begin{cases} x - 2 \leq 3x - 2x^2 \\ 2x + 1 > |-2x - 1|. \end{cases}$$

Answer: A $0 < x \leq \frac{1}{2}(\sqrt{5} - 1)$ B $\sqrt{3} - 1 \leq x < 2$ C No x D $0 < x < 2$ E $\frac{1}{2}(1 - \sqrt{5}) \leq x < 0$ → **C**

5) Find the domain of definition of the expression: $\log\left(\frac{(-2 + 2x)(2 + x)}{-2 + 2x}\right)$.

Answer: A $x > -2$ B $0 < x < \frac{3}{2}$ or $x > 2$ C $x < -4$ or $\frac{1}{2} < x < 3$ D $x < -4$ or $-2 < x < \frac{3}{2}$ E $-4 < x < -3$ or $x > 1$ → **A**

6) Find all x such that $\frac{(-3 + 2x)(3 - x)}{1 + 3x} < 0$.

Answer: A $-\frac{1}{3} < x < \frac{3}{2}$ or $x > 3$ B $\frac{1}{3} < x < 4$ C $x < -2$ or $-\frac{2}{3} < x < 3$ D $-3 < x < -\frac{2}{3}$ or $x > 1$ E $x > 1$ → **A**

7) Compute the limit $\lim_{x \rightarrow -\infty} e^{-x} - \frac{e^{3x}}{x^2}$.

Answer: A $+\infty$ B π C -1 D $-\pi$ E Does not exist F $-e$ → **A**

8) Compute the limit $\lim_{x \rightarrow -1^+} \frac{e^{5/x}}{-3x - 3}$.

Answer: A 1 B $+\infty$ C 0 D -1 E $-\infty$ F Does not exist → **E**

9) Compute the limit $\lim_{x \rightarrow 0^+} 3x - \frac{3}{x} - 3 \log(x)$.

Answer: A π B 0 C $-\infty$ D 1 E $+\infty$ F Does not exist → **C**

10) Compute the limit $\lim_{x \rightarrow -\infty} \frac{-4x^3 + x^2 + x + 1}{-2x^3 + x^2 + 1}$.

Answer: A 0 B Does not exist C -3 D $-\frac{1}{2}$ E $+\infty$ F 2 → **F**

Family name:

First name:

Matr.no.:

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{(a^7b^4)\sqrt[6]{a^6b^2c^4}}{(a^3b^3)\sqrt[3]{b^3c^4}}$.

Answer: A $\frac{a^{9/2}b^{4/5}}{c^{7/10}}$ B $\frac{a^{19/3}}{b^{5/2}c^{31/30}}$ C $\frac{a^{2/3}}{b^{11/30}c^{19/20}}$ D $\frac{a^5\sqrt[3]{b}}{c^{2/3}}$ E $\frac{1}{a^{5/6}b^{41/12}}$ → **D**

2) Compute all solutions of the system

$$\begin{cases} 4x + 5y - 2 = x + 2y \\ x + y = 4x + 2y. \end{cases}$$

Answer: A $x = -\frac{2}{9}$ and $y = \frac{1}{9}$ B $x = -\frac{8}{19}$ and $y = \frac{2}{19}$ C $x = -\frac{1}{6}$ and $y = \frac{1}{2}$ D $x = -\frac{1}{3}$ and $y = 1$ E $x = \frac{2}{13}$ and $y = \frac{14}{13}$ → **D**

3) Compute all solutions of the inequality $-3|x-3| + x - 3 > -x^2$.

Answer: A $x < \frac{1}{4}(-1 - \sqrt{73})$ or $x > \frac{1}{4}(\sqrt{73} - 1)$ B $x < \frac{1}{6}(1 - \sqrt{13})$ or $x > \frac{1}{6}(1 + \sqrt{13})$ C $x < -1 - \sqrt{13}$ or $x > \sqrt{13} - 1$ D $-2 - \sqrt{6} < x < \sqrt{6} - 2$ E $x < -6$ or $x > 2$ → **E**

4) Compute all solutions of the system of inequalities

$$\begin{cases} 2x^2 + 3x - 2 < -2x^2 \\ -x \geq |2x - 1| + 1. \end{cases}$$

Answer: A $-1 \leq x \leq -\frac{1}{3}$ B $\frac{1}{3} \leq x < \frac{1}{2}(\sqrt{17} - 3)$ C No x D $x > 1$ or $x \leq 0$ E $\frac{1}{3} \leq x \leq 1$ → **C**

5) Find the domain of definition of the expression: $\sqrt{\frac{(1-3x)(2-3x)}{-2-x}}$.

Answer: A $\frac{1}{3} < x \leq 3$ B $x < \frac{2}{3}$ or $x \geq 3$ C $-2 \leq x < -1$ or $x \geq \frac{1}{3}$ D $x \leq -3$ or $-1 < x \leq -\frac{1}{2}$ E $x < -2$ or $\frac{1}{3} \leq x \leq \frac{2}{3}$ → **E**

6) Find all x such that $\frac{3+2x}{(5+x)(-2+3x)} \leq 0$.

Answer: A $x < -1$ or $-\frac{2}{3} < x \leq 1$ B $-3 < x < 0$ or $x \geq 3$ C $x < -5$ or $-\frac{3}{2} \leq x < \frac{2}{3}$ D $x < -5$ or $-\frac{2}{3} < x \leq 1$ E $-\frac{4}{3} < x < 0$ → **C**

7) Compute the limit $\lim_{x \rightarrow -\infty} e^{-2x}x^3 - e^x x^2$.

Answer: A 2 B Does not exist C $-e$ D $-\infty$ E $+\infty$ F π → **D**

8) Compute the limit $\lim_{x \rightarrow 0^-} \frac{e^{2/x}(-x-2)}{2-x}$.

Answer: A 1 B $-e$ C e D Does not exist E -1 F 0 → **F**

9) Compute the limit $\lim_{x \rightarrow +\infty} x - \frac{3}{x} + \log(x)$.

Answer: A 0 B 2 C $-\infty$ D $+\infty$ E Does not exist F $-\pi$ → **D**

10) Compute the limit $\lim_{x \rightarrow +\infty} \frac{-6x^3 + 2x^2 + x + 1}{2x^3 + x^2 + 1}$.

Answer: A $\frac{1}{2}$ B $-\frac{1}{2}$ C -3 D Does not exist E $+\infty$ F -2 → **C**

Family name: _____ First name: _____ Matr.no.: _____

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[5]{a^7 b^4} \sqrt[6]{a^4 b^4 c^3}}{(a^3 b^2)^4 \sqrt[4]{b^3 c^6}}$.

Answer: A $\frac{1}{a^{3/2} b^{29/12}}$ B $\frac{1}{\sqrt[3]{ab} \sqrt[3]{c}}$ C $\frac{1}{a^{14/15} b^{77/60} c}$ D $\frac{a}{b^{37/20}}$ E $\frac{1}{a^{3/2} b^{2/3} c^{7/4}}$ → **C**

2) Compute all solutions of the system

$$\begin{cases} -5x - y - 2 = 2y - 2x \\ x - 2y = -2x - y. \end{cases}$$

Answer: A $x = -\frac{1}{6}$ and $y = -\frac{1}{2}$ B $x = -\frac{6}{5}$ and $y = \frac{14}{5}$ C $x = -\frac{4}{21}$ and $y = \frac{1}{3}$ D $x = \frac{6}{11}$ and $y = -\frac{14}{11}$ → **A**
 E $x = -\frac{1}{4}$ and $y = \frac{7}{12}$

3) Compute all solutions of the inequality $2|x - 3| - 3x - 1 > -3x^2$.

Answer: A $x < \frac{1}{2}(3 - \sqrt{5})$ or $x > \frac{1}{2}(3 + \sqrt{5})$ B $x < \frac{1}{2}$ C $x < \frac{1}{3}(1 - \sqrt{19})$ or $x > \frac{1}{3}(1 + \sqrt{19})$ D $-\sqrt{3}$ E All → **E**
R

4) Compute all solutions of the system of inequalities

$$\begin{cases} |x + 1| - 2x \leq -2 \\ -x^2 - 2x + 1 > 1 - 3x. \end{cases}$$

Answer: A $x \leq -2$ B No x C $x < -1$ D $x < 0$ E $x \geq \frac{5}{3}$ → **B**

5) Find the domain of definition of the expression: $\sqrt{\frac{(2 - 3x)(3 - x)}{x}}$.

Answer: A $-1 < x \leq \frac{3}{2}$ or $x \geq 4$ B $x \leq -4$ or $-1 < x \leq \frac{1}{2}$ C $x < -2$ or $-1 \leq x \leq 3$ → **D**
 D $0 < x \leq \frac{2}{3}$ or $x \geq 3$ E $-2 < x \leq \frac{4}{3}$ or $x \geq 2$

6) Find all x such that $\frac{(1 - x)(3 - 3x)}{2 + 3x} \geq 0$.

Answer: A $-\frac{1}{2} \leq x < -\frac{1}{3}$ or $x \geq 4$ B $x > -\frac{2}{3}$ C $x \leq -4$ or $0 < x \leq 1$ D $-4 \leq x < \frac{1}{3}$ or $x \geq \frac{3}{2}$ → **B**
 E $x \leq -4$ or $-\frac{1}{3} < x \leq \frac{1}{2}$

7) Compute the limit $\lim_{x \rightarrow +\infty} e^{-3x} - \frac{e^x}{x^3}$.

Answer: A $-\infty$ B -1 C Does not exist D 1 E π F 0 → **A**

8) Compute the limit $\lim_{x \rightarrow -1^+} \frac{e^{3/x}}{-3x - 3}$.

Answer: A 2 B Does not exist C -1 D π E 1 F $-\infty$ → **F**

9) Compute the limit $\lim_{x \rightarrow +\infty} -x^2 + x + \log(x)$.

Answer: A -1 B Does not exist C $-\infty$ D $-\pi$ E 1 F $+\infty$ → **C**

10) Compute the limit $\lim_{x \rightarrow -\infty} \frac{-4x^3 + 3x^2 - x + 1}{2x^3 + x^2}$.

Answer: A -3 B π C -2 D $+\infty$ E 1 F Does not exist → **C**

Family name: _____ First name: _____ Matr.no.: _____

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[3]{a^7 b^4} \sqrt[6]{a^6 b^3 c^2}}{(a^2 b^4)^{5/3} \sqrt[5]{b^3 c^6}}$.

Answer: A $\frac{a}{b^{11/3} c^{3/2}}$ B $\frac{a^6 b^{13/4}}{\sqrt{c}}$ C $\frac{a^{4/3}}{b^{83/30} c^{13/15}}$ D $\frac{a^{4/5}}{b^{13/10} c^{2/15}}$ E $a^5 b^{19/10} c^{6/5}$ → **C**

2) Compute all solutions of the system

$$\begin{cases} x - y + 2 = 2y - 2x \\ x + y = -2x - y. \end{cases}$$

Answer: A $x = \frac{6}{29}$ and $y = \frac{8}{29}$ B $x = 0$ and $y = -1$ C $x = -\frac{2}{3}$ and $y = \frac{8}{3}$ D $y = -3x - 2$ → **E**
 E $x = -\frac{4}{15}$ and $y = \frac{2}{5}$

3) Compute all solutions of the inequality $-2|x - 1| + x + 1 \leq x^2$.

Answer: A $x \leq -\frac{3}{2}$ or $x \geq 1$ B $-1 - \sqrt{5} \leq x \leq 2 + \sqrt{2}$ C $x \leq \frac{1}{2}(3 - \sqrt{5})$ or $x \geq \frac{1}{2}(\sqrt{13} - 1)$ D 0 E $-\sqrt{3}$ → **C**

4) Compute all solutions of the system of inequalities

$$\begin{cases} x - 2 \leq -2x^2 - x \\ x - 3 > |-2x - 1|. \end{cases}$$

Answer: A No x B $\sqrt{6} - 2 \leq x < 2$ C $x > -\frac{1}{4}$ D $1 - \sqrt{2} \leq x < 0$ E $-\frac{1}{3} < x \leq \frac{1}{2}(1 + \sqrt{5})$ → **A**

5) Find the domain of definition of the expression: $\sqrt{\frac{(-1+x)(3+x)}{1+3x}}$.

Answer: A $x \leq -3$ or $-\frac{2}{3} < x \leq \frac{3}{2}$ B $x \leq -2$ or $x > 2$ C $-3 \leq x < -\frac{1}{3}$ or $x \geq 1$ → **C**
 D $x \leq -4$ or $1 < x \leq 3$ E $-4 \leq x < -2$ or $x \geq 3$

6) Find all x such that $\frac{(-1-x)(3-x)}{-1+3x} \geq 0$.

Answer: A $-3 \leq x \leq -\frac{3}{2}$ or $x > \frac{1}{3}$ B $-4 \leq x < -\frac{1}{3}$ or $x \geq \frac{1}{2}$ C $-1 \leq x < \frac{1}{3}$ or $x \geq 3$ → **C**
 D $-\frac{3}{2} \leq x < -\frac{1}{3}$ or $x \geq 2$ E $x \leq -\frac{1}{2}$ or $\frac{1}{3} < x \leq 3$

7) Compute the limit $\lim_{x \rightarrow -\infty} e^x - e^x x$.

Answer: A $+\infty$ B 2 C π D Does not exist E $-\pi$ F 0 → **F**

8) Compute the limit $\lim_{x \rightarrow 0^-} \frac{e^{2/x}}{-x^2 + x + 2}$.

Answer: A $+\infty$ B e C Does not exist D 0 E π F -1 → **D**

9) Compute the limit $\lim_{x \rightarrow 0^+} x + \frac{3}{x} - \log(x)$.

Answer: A Does not exist B 0 C $-e$ D π E $+\infty$ F e → **E**

10) Compute the limit $\lim_{x \rightarrow +\infty} \frac{4x^3 + 2x^2 - x + 1}{x^2}$.

Answer: A $\frac{3}{2}$ B Does not exist C $\frac{1}{2}$ D $+\infty$ E -1 F $-\frac{1}{2}$ → **D**

Family name:

First name:

Matr.no.:

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[3]{a^3b^4}\sqrt[4]{a^4b^2c^2}}{(a^2b^3)\sqrt[4]{b^3c^2}}$.

Answer: A $\frac{\sqrt{ab^{3/10}}}{c^{11/20}}$

B $\frac{a^{3/2}}{b^{15/4}\sqrt{c}}$

C $\frac{\sqrt{c}}{\sqrt[3]{ab^{9/20}}}$

D $\frac{1}{a^{12/5}b^{9/4}}$

E $\frac{1}{b^{23/12}}$

→ E

2) Compute all solutions of the system

$$\begin{cases} -5x + 2y - 2 = x + y \\ x + y = 4x - 2y. \end{cases}$$

Answer: A $y = -\frac{3x}{2} - 1$

B $x = -\frac{1}{2}$ and $y = -2$

C $x = \frac{2}{7}$ and $y = -\frac{1}{14}$

D $x = 6$ and $y = -2$

E $x = -\frac{2}{5}$ and $y = -\frac{2}{5}$

→ E

3) Compute all solutions of the inequality $|x - 3| - x + 1 \leq x^2$.

Answer: A $x \leq -4$ or $x \geq 0$ B $x \leq -1 - \sqrt{2}$ or $x \geq \sqrt{2} - 1$ C $-1 - \sqrt{13} \leq x \leq \sqrt{13} - 1$ D $x \leq \frac{1}{6}(-5 - \sqrt{85})$ or $x \geq \frac{1}{6}(\sqrt{85} - 5)$ E $x \leq -1 - \sqrt{5}$ or $x \geq \sqrt{5} - 1$

→ E

4) Compute all solutions of the system of inequalities

$$\begin{cases} |x + 3| - 2x \leq -2 \\ -x^2 - 2x + 1 > x + 1. \end{cases}$$

Answer: A No x

B $x \geq \frac{5}{3}$

C $-3 < x \leq -2$

D $0 < x < 4$

E $-3 < x \leq -1$

→ A

5) Find the domain of definition of the expression: $\sqrt{\frac{(1+2x)(2-x)}{2+3x}}$.

Answer: A $-3 \leq x \leq -\frac{3}{2}$ or $x > -\frac{2}{3}$

B $x < -\frac{2}{3}$ or $-\frac{1}{2} \leq x \leq 2$

C $x \leq -4$ or $\frac{1}{3} \leq x < 2$

D $-\frac{2}{3} < x \leq -\frac{1}{2}$ or $x \geq 1$

E $0 < x \leq \frac{4}{3}$

→ B

6) Find all x such that $\frac{(-1-2x)(3+x)}{2+3x} \geq 0$.

Answer: A $-3 \leq x \leq -\frac{3}{2}$ or $x > -\frac{2}{3}$

B $x < -\frac{1}{3}$ or $\frac{2}{3} \leq x \leq 1$

C $-4 \leq x \leq -3$ or $x > 0$

D $x \leq -\frac{3}{2}$ or $-\frac{2}{3} < x \leq 1$

E $x \leq -3$ or $-\frac{2}{3} < x \leq -\frac{1}{2}$

→ E

7) Compute the limit $\lim_{x \rightarrow +\infty} e^x - \frac{e^{-x}}{x^3}$.

Answer: A $-\pi$

B 2

C 0

D $+\infty$

E π

F Does not exist

→ D

8) Compute the limit $\lim_{x \rightarrow 0^+} \frac{e^{\frac{1}{x}}}{-2x^2 + x + 2}$.

Answer: A -1

B $+\infty$

C 2

D Does not exist

E 1

F π

→ B

9) Compute the limit $\lim_{x \rightarrow +\infty} -x^2 - 3x + \log(x)$.

Answer: A -1

B Does not exist

C e

D π

E $-\infty$

F $-\pi$

→ E

10) Compute the limit $\lim_{x \rightarrow +\infty} \frac{x^2 - 2x + 1}{-2x^3 + x^2 + 1}$.

Answer: A $+\infty$

B 2

C -3

D Does not exist

E 0

F $-\frac{3}{2}$

→ E

Family name: _____ First name: _____ Matr.no.: _____

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[5]{a^5 b^4} \sqrt[4]{a^4 b^2 c^2}}{(a^4 b^3) \sqrt[3]{b^5 c^6}}$.

Answer: A $\frac{a^{2/3} \sqrt[10]{c}}{b^{8/3}}$ B $\frac{1}{a^2 b^{101/30} c^{3/2}}$ C $\frac{a}{\sqrt[12]{bc}}$ D $\frac{\sqrt[10]{c}}{a^{2/3} b}$ E $\frac{1}{\sqrt{ab^{11/6} c^{13/12}}}$ → **B**

2) Compute all solutions of the system

$$\begin{cases} 4x + 5y + 2 = x + 2y \\ x - 2y = 2y - 2x. \end{cases}$$

Answer: A $x = \frac{3}{11}$ and $y = -\frac{4}{11}$ B $x = -\frac{8}{5}$ and $y = \frac{14}{5}$ C $x = -\frac{8}{21}$ and $y = -\frac{2}{7}$ D $x = \frac{2}{15}$ and $y = \frac{4}{15}$ E $x = -\frac{2}{27}$ and $y = \frac{7}{27}$ → **C**

3) Compute all solutions of the inequality $2x^2 < 2 - x + |-2x + 1|$.

Answer: A $-1 < x < 2$ B $\frac{1}{4}(-3 - \sqrt{33}) < x < 1$ C $-1 < x < \frac{1}{4}$ D $-\frac{3}{2} < x < \frac{1}{4}(3 + \sqrt{17})$ E $-4 < x < 1$ → **B**

4) Compute all solutions of the system of inequalities

$$\begin{cases} |x - 1| - 2x \leq -2 \\ x^2 + x + 2 > 2 - 3x. \end{cases}$$

Answer: A $x \geq 1$ B $x \leq -\frac{5}{3}$ C $-3 < x \leq -\frac{5}{3}$ D $0 < x < 4$ E $x \leq -2$ → **A**

5) Find the domain of definition of the expression: $\sqrt{\frac{(3-x)(4-x)}{2+x}}$.

Answer: A $x < -2$ or $\frac{4}{3} \leq x \leq 2$ B $-2 < x \leq 3$ or $x \geq 4$ C $x \leq -2$ or $-1 < x \leq \frac{3}{2}$ D $-\frac{1}{2} \leq x < \frac{1}{3}$ or $x \geq 2$ E $-1 < x \leq 3$ → **B**

6) Find all x such that $\frac{3+x}{(3-x)(1+3x)} > 0$.

Answer: A $-\frac{3}{2} < x < -\frac{2}{3}$ or $x > 2$ B $x < -3$ or $-\frac{3}{2} < x < -\frac{1}{3}$ C $x < -\frac{1}{3}$ or $x > 2$ D $-3 < x < -\frac{3}{2}$ or $x > 0$ E $x < -3$ or $-\frac{1}{3} < x < 3$ → **E**

7) Compute the limit $\lim_{x \rightarrow -\infty} e^{-x} - \frac{e^{2x}}{x^3}$.

Answer: A 2 B π C Does not exist D $+\infty$ E -1 F 1 → **D**

8) Compute the limit $\lim_{x \rightarrow -\frac{3}{5}^+} \frac{e^{\frac{1}{x}}}{-5x - 3}$.

Answer: A -1 B Does not exist C 2 D $-\infty$ E $-e$ F $+\infty$ → **D**

9) Compute the limit $\lim_{x \rightarrow +\infty} x + \frac{1}{x} + \log(x)$.

Answer: A $-\infty$ B $-\pi$ C e D $+\infty$ E -1 F Does not exist → **D**

10) Compute the limit $\lim_{x \rightarrow +\infty} \frac{-6x^3 + 3x^2 - 2x + 1}{x^2 - 4x^3}$.

Answer: A $\frac{1}{2}$ B $\frac{3}{2}$ C $+\infty$ D Does not exist E -2 F -3 → **B**

Family name:

First name:

Matr.no.:

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[5]{a^7 b^5} \sqrt[4]{a^4 b^3 c}}{(a^3 b^4) \sqrt[3]{b c^4}}$.

Answer: A $\frac{1}{a^{2/5} b^{43/15} \sqrt[6]{c}}$ B $\frac{a^6}{\sqrt[6]{b} \sqrt{c}}$ C $\frac{a^{13/2} b^{3/4}}{\sqrt{c}}$ D $\frac{a^2 c}{b^{31/12}}$ E $\frac{1}{a^{3/5} b^{31/12} c^{13/12}}$ → **E**

2) Compute all solutions of the system

$$\begin{cases} -2x - y - 2 = x + y \\ y - 3x = x - y. \end{cases}$$

Answer: A $x = -\frac{1}{10}$ and $y = \frac{7}{30}$ B $x = 2$ and $y = 7$ C $x = -\frac{4}{47}$ and $y = -\frac{14}{47}$ D $x = -\frac{2}{7}$ and $y = -\frac{4}{7}$ E $x = -\frac{3}{5}$ and $y = \frac{1}{5}$ → **D**

3) Compute all solutions of the inequality $2x^2 + |2x + 2| \geq -x - 2$.

Answer: A $x \leq \frac{1}{2}(1 - \sqrt{5})$ or $x \geq \frac{1}{2}(1 + \sqrt{5})$ B $x \leq \frac{1}{4}(-1 - \sqrt{33})$ or $x \geq 0$ C $x \leq \frac{1}{4}(-3 - \sqrt{41})$ or $x \geq \frac{1}{4}(\sqrt{41} - 3)$ D All R E $x \leq -\frac{1}{2}$ or $x \geq \frac{3}{2}$ → **D**

4) Compute all solutions of the system of inequalities

$$\begin{cases} |1 - x| > 1 - 2x \\ x > x^2 + x. \end{cases}$$

Answer: A $x < -\sqrt{\frac{2}{3}}$ or $\sqrt{\frac{2}{3}} < x < 1$ B $0 < x < \sqrt{2}$ C No x D $2 - \sqrt{3} < x < 1$ E $-2 < x < 0$ or $x > 0$ → **C**

5) Find the domain of definition of the expression: $\log\left(\frac{(-1 + 2x)(3 + 2x)}{-1 - x}\right)$.

Answer: A $-\frac{1}{2} < x < \frac{3}{2}$ B -1 C $x < -4$ or $2 < x < 3$ D $-2 < x < 2$ E $x < -\frac{3}{2}$ or $-1 < x < \frac{1}{2}$ → **E**

6) Find all x such that $\frac{(-1 - 3x)(2 - x)}{-1 + 3x} < 0$.

Answer: A $x < -\frac{1}{3}$ or $\frac{1}{3} < x < 2$ B $-3 < x < -\frac{1}{2}$ or $x > \frac{1}{3}$ C $x < -3$ or $-\frac{2}{3} < x < \frac{2}{3}$ D $-3 < x < -\frac{3}{2}$ or $x > \frac{1}{3}$ E $-3 < x < \frac{1}{2}$ or $x > \frac{2}{3}$ → **A**

7) Compute the limit $\lim_{x \rightarrow -\infty} e^{-x} - e^x x^2$.

Answer: A $-e$ B Does not exist C 1 D e E 0 F $+\infty$ → **F**

8) Compute the limit $\lim_{x \rightarrow 1^+} \frac{e^{-3/x}}{x - 1}$.

Answer: A $-e$ B e C $-\infty$ D $+\infty$ E Does not exist F π → **D**

9) Compute the limit $\lim_{x \rightarrow +\infty} \frac{5}{x^4} - 3x + \log(x)$.

Answer: A π B Does not exist C $-\infty$ D $-e$ E 0 F $-\pi$ → **C**

10) Compute the limit $\lim_{x \rightarrow +\infty} \frac{x^2 + x + 1}{x^2 - 4x^3}$.

Answer: A 3 B Does not exist C 2 D $\frac{1}{2}$ E 1 F 0 → **F**

Family name: _____ First name: _____ Matr.no.: _____

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[5]{a^9 b^5} \sqrt[6]{a^6 b^2 c^2}}{(a^4 b^3)^4 \sqrt[4]{b^3 c^6}}$.

Answer: A $\frac{c^{3/5}}{a^{3/2} b^{21/20}}$ B $\frac{1}{a^{6/5} b^{29/12} c^{7/6}}$ C $\frac{a^6 b^{12/5}}{c^{7/10}}$ D $\frac{a^{2/3}}{b^{11/30} c^{19/20}}$ E $\frac{a^{23/3}}{b^{7/4} \sqrt{c}}$ → **B**

2) Compute all solutions of the system

$$\begin{cases} -2x - y + 2 = x + y \\ y - 3x = 2y - 2x. \end{cases}$$

Answer: A $x = \frac{2}{15}$ and $y = -\frac{1}{5}$ B $x = \frac{6}{7}$ and $y = -\frac{8}{7}$ C $x = 2$ and $y = -2$ D $x = \frac{2}{3}$ → **C**
 E $x = 0$ and $y = -1$

3) Compute all solutions of the inequality $2|x+1| - x + 1 > -x^2$.

Answer: A All \mathbf{R} B $x < -1$ or $x > \frac{5}{2}$ C $x < -1$ or $x > -\frac{1}{2}$ D $x < -\sqrt{2}$ or $x > \frac{1}{2}(\sqrt{5} - 1)$ E -2 → **A**

4) Compute all solutions of the system of inequalities

$$\begin{cases} x^2 + x + 1 < -2x^2 \\ x \geq |2x + 1| + 1. \end{cases}$$

Answer: A $-2 \leq x < \frac{1}{2}(\sqrt{5} - 3)$ B $0 \leq x \leq \frac{2}{3}$ C $0 \leq x < \frac{2}{3}$ D $\frac{1}{3} \leq x < \frac{1}{6}(\sqrt{33} - 3)$ E No x → **E**

5) Find the domain of definition of the expression: $\sqrt{\frac{(3-3x)(3+x)}{1+x}}$.

Answer: A $x \leq -3$ or $-1 < x \leq 1$ B $-4 \leq x \leq \frac{1}{2}$ or $x > 1$ C $-4 \leq x \leq -\frac{3}{2}$ or $x > -1$ D $-3 \leq x < -2$ → **A**
 E $x \leq -3$ or $1 < x \leq \frac{3}{2}$

6) Find all x such that $\frac{(-1-x)(3-x)}{2+3x} < 0$.

Answer: A $-5 < x < -4$ or $x > \frac{1}{3}$ B $x < -1$ or $-\frac{2}{3} < x < 3$ C $x < -2$ or $-\frac{1}{3} < x < 3$ → **B**
 D $x < -\frac{5}{3}$ or $-\frac{2}{3} < x < 3$ E $-\frac{1}{2} < x < -\frac{1}{3}$ or $x > \frac{4}{3}$

7) Compute the limit $\lim_{x \rightarrow +\infty} e^{-2x} - \frac{e^x}{x^3}$.

Answer: A 0 B Does not exist C $-\infty$ D $-\pi$ E $-e$ F e → **C**

8) Compute the limit $\lim_{x \rightarrow \frac{3}{5}^-} \frac{e^{3/x}}{5x-3}$.

Answer: A $-e$ B $-\pi$ C Does not exist D $-\infty$ E -1 F 1 → **D**

9) Compute the limit $\lim_{x \rightarrow 0^+} \frac{1}{x^4} - x + \log(x)$.

Answer: A Does not exist B π C e D $+\infty$ E $-\infty$ F 0 → **D**

10) Compute the limit $\lim_{x \rightarrow +\infty} \frac{x^2 + 1}{4x^3 + x^2}$.

Answer: A Does not exist B 2 C $-\frac{3}{2}$ D 0 E π F $+\infty$ → **D**

Family name: _____ First name: _____ Matr.no.: _____

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[3]{a^9 b^2} \sqrt[4]{a^4 b^2 c^4}}{(a^3 b^3)^4 \sqrt[4]{b^3 c^6}}$.

Answer: A $\frac{1}{a^{3/2} b^{2/3} c^{7/4}}$ B $\frac{a^7 b^{3/4}}{\sqrt{c}}$ C $\frac{a}{b^{31/12} \sqrt{c}}$ D $\frac{1}{\sqrt[3]{bc^{3/20}}}$ E $\frac{a^{4/3}}{b^{8/3} \sqrt{c}}$ → **C**

2) Compute all solutions of the system

$$\begin{cases} -2x + 5y + 2 = x + y \\ -3x - 2y = 4x + y. \end{cases}$$

Answer: A $x = \frac{6}{37}$ and $y = -\frac{14}{37}$ B $x = \frac{2}{3}$ and $y = \frac{14}{9}$ C $x = -\frac{2}{3}$ and $y = -\frac{1}{3}$ D $x = \frac{8}{3}$ and $y = -\frac{2}{3}$ → **A**
 E $x = \frac{2}{31}$ and $y = -\frac{14}{31}$

3) Compute all solutions of the inequality $2|x+1| - x + 1 \leq 3x^2$.

Answer: A $x \leq 0$ B $x \leq -\sqrt{\frac{2}{3}}$ or $x \geq \sqrt{\frac{2}{3}}$ C $x \leq \frac{1}{6}(1 - \sqrt{37})$ or $x \geq \frac{1}{6}(1 + \sqrt{37})$ D $x \leq -2 - \sqrt{2}$ or $x \geq 0$ → **C**
 E $x \leq -4$ or $x \geq \sqrt{3} - 1$

4) Compute all solutions of the system of inequalities

$$\begin{cases} 2x^2 - x - 2 < x^2 \\ x \geq |1 - 2x| - 1. \end{cases}$$

Answer: A $-2 \leq x \leq 0$ B $\frac{1}{6}(-3 - \sqrt{33}) < x \leq 0$ C $x > 2$ D $0 \leq x < 2$ E No x → **D**

5) Find the domain of definition of the expression: $\sqrt{\frac{(2+2x)(3-x)}{-2+x}}$.

Answer: A $x \leq -3$ or $0 < x \leq \frac{1}{2}$ B $x \leq -1$ or $2 < x \leq 3$ C $x < 1$ or $\frac{4}{3} \leq x \leq \frac{3}{2}$ D $x \geq 0$ → **B**
 E $x \leq -\frac{3}{2}$ or $-\frac{2}{3} < x \leq 1$

6) Find all x such that $\frac{(-5-3x)(3-x)}{3x} < 0$.

Answer: A $x < -1$ or $\frac{2}{3} < x < 1$ B $x < -\frac{5}{3}$ or $0 < x < 3$ C $x < -2$ or $\frac{1}{3} < x < \frac{3}{2}$ D $x < \frac{1}{3}$ → **B**
 E $-2 < x < -\frac{2}{3}$ or $x > -\frac{1}{2}$

7) Compute the limit $\lim_{x \rightarrow -\infty} \frac{e^{-2x}}{x} - e^x x^3$.

Answer: A $-\infty$ B 0 C e D 1 E π F Does not exist → **A**

8) Compute the limit $\lim_{x \rightarrow -\infty} \frac{e^{-2/x}(2x+1)}{-x-1}$.

Answer: A π B 0 C Does not exist D 1 E -2 F $-\pi$ → **E**

9) Compute the limit $\lim_{x \rightarrow +\infty} \frac{1}{x^4} + x - \log(x)$.

Answer: A $-\infty$ B Does not exist C $+\infty$ D 0 E $-\pi$ F 1 → **C**

10) Compute the limit $\lim_{x \rightarrow -\infty} \frac{4x^3 + 2x^2 + x + 1}{-2x^3 + x^2 + 1}$.

Answer: A -2 B $-\infty$ C Does not exist D $-e$ E $+\infty$ F $-\frac{1}{2}$ → **A**

Family name: _____ First name: _____ Matr.no.: _____

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{(a^3b^4)\sqrt[4]{a^2b^3c^2}}{(a^4b^3)\sqrt[5]{bc^2}}$.

Answer: A $\frac{1}{a^{6/5}b^{29/12}c^{7/6}}$ B $\frac{a^{5/3}\sqrt[10]{c}}{b^{17/6}}$ C $\frac{1}{a^{5/3}b^{31/12}c^{7/6}}$ D $\frac{1}{a^{14/15}b^{77/60}c}$ E $\frac{b^{31/20}\sqrt[10]{c}}{\sqrt{a}}$ → **E**

2) Compute all solutions of the system

$$\begin{cases} 4x - 4y + 2 = x + 2y \\ y - 3x = x - y. \end{cases}$$

Answer: A $x = \frac{2}{9}$ and $y = \frac{4}{9}$ B $x = -\frac{4}{29}$ and $y = -\frac{14}{29}$ C $x = \frac{2}{11}$ and $y = \frac{14}{11}$ D $x = -\frac{8}{23}$ and $y = \frac{2}{23}$ E $x = \frac{8}{31}$ and $y = -\frac{14}{31}$ → **A**

3) Compute all solutions of the inequality $-2|x - 3| + x - 1 \leq 3x^2$.

Answer: A $x \leq -1 - \sqrt{2}$ or $x \geq \sqrt{2} - 1$ B $-\sqrt{2} \leq x \leq \sqrt{2}$ C $x \leq \frac{1}{6}(-3 - \sqrt{21})$ or $x \geq \frac{1}{6}(\sqrt{21} - 3)$ D All \mathbf{R} E $x \leq -\frac{3}{2}$ or $x \geq 1$ → **D**

4) Compute all solutions of the system of inequalities

$$\begin{cases} x - 2 \leq -2x^2 - x \\ 2x + 1 > |x + 1|. \end{cases}$$

Answer: A $x > 2$ B $x > 0$ C $-\frac{1}{4} < x \leq 1 + \sqrt{2}$ D $x \geq 1 + \sqrt{3}$ E $0 < x \leq \frac{1}{2}(\sqrt{5} - 1)$ → **E**

5) Find the domain of definition of the expression: $\log\left(\frac{(-3+x)(2+x)}{1-4x}\right)$.

Answer: A $x < -3$ or $-1 < x < 1$ B $x < -\frac{1}{2}$ or $2 < x < 3$ C $-1 < x < \frac{1}{2}$ or $x > 2$ D $-1 < x < \frac{1}{2}$ E $x < -2$ or $\frac{1}{4} < x < 3$ → **E**

6) Find all x such that $\frac{3+2x}{(3+x)(3x)} > 0$.

Answer: A $-2 < x < -\frac{1}{2}$ or $x > 0$ B $-3 < x < -\frac{3}{2}$ or $x > 0$ C $-4 < x < 0$ or $x > 1$ D $-\frac{3}{2} < x < -\frac{1}{3}$ or $x > 2$ E $x < -3$ or $\frac{1}{3} < x < 1$ → **B**

7) Compute the limit $\lim_{x \rightarrow -\infty} \frac{e^{-2x}}{x} - \frac{e^{3x}}{x^2}$.

Answer: A -1 B 2 C $-\infty$ D $+\infty$ E Does not exist F $-e$ → **C**

8) Compute the limit $\lim_{x \rightarrow 0^-} e^{-1/x}(-x^2 - x)$.

Answer: A e B -1 C 0 D Does not exist E $-\pi$ F $+\infty$ → **F**

9) Compute the limit $\lim_{x \rightarrow +\infty} 3x^2 - 3x + \log(x)$.

Answer: A $-e$ B $+\infty$ C 0 D Does not exist E π F $-\infty$ → **B**

10) Compute the limit $\lim_{x \rightarrow -\infty} \frac{2x^3 + x^2 + 1}{x^2 - 4x^3}$.

Answer: A $-\frac{1}{2}$ B -1 C Does not exist D $-\pi$ E e F $-e$ → **A**

Family name:

First name:

Matr.no.:

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{(a^3b^2) \sqrt[4]{a^2b^4c^4}}{(a^2b^2) \sqrt[5]{b^3c^2}}$.

Answer: A $a^{3/2}b^{2/5}c^{3/5}$ B $\frac{c^{5/6}}{\sqrt[3]{ab^{4/3}}}$ C $\frac{a^{7/3}\sqrt{c}}{b^{43/12}}$ D $\frac{a^{3/5}c^{7/10}}{b^{9/10}}$ E $\frac{a^{2/3}}{b^{9/4}c^{2/3}}$ → **A**

2) Compute all solutions of the system

$$\begin{cases} -5x + 5y + 2 = y - 2x \\ x - 2y = 4x + y. \end{cases}$$

Answer: A $y = -\frac{3x}{2} - \frac{1}{2}$ B $x = \frac{6}{23}$ and $y = -\frac{14}{23}$ C $x = \frac{2}{7}$ and $y = -\frac{2}{7}$ D $x = \frac{2}{15}$ and $y = \frac{1}{5}$ E $x = -\frac{1}{11}$ and $y = \frac{7}{11}$ → **C**

3) Compute all solutions of the inequality $3x^2 < -2 - x + |-x + 2|$.

Answer: A $-1 < x < 0$ B $-\frac{2}{3} < x < 0$ C $0 < x < \frac{1}{3}$ D $-\sqrt{\frac{5}{2}} < x < \sqrt{\frac{5}{2}}$ E $-1 - \sqrt{2} < x < \sqrt{2} - 1$ → **B**

4) Compute all solutions of the system of inequalities

$$\begin{cases} x - 2 \leq x^2 + 3x \\ 2x - 3 > |x + 1|. \end{cases}$$

Answer: A $x \geq 1$ B $x > 0$ C $0 < x < 2$ D $x > 4$ E $1 - \sqrt{2} \leq x \leq 1 + \sqrt{2}$ → **D**

5) Find the domain of definition of the expression: $\sqrt{\frac{(3+2x)(3-3x)}{2-x}}$.

Answer: A $-4 \leq x < 0$ B $-\frac{3}{2} \leq x \leq 1$ or $x > 2$ C $x \leq -2$ or $-\frac{1}{3} \leq x < \frac{2}{3}$ D $-\frac{2}{3} < x \leq \frac{1}{2}$ or $x \geq 4$ E $x \leq -2$ or $-\frac{1}{3} < x \leq 2$ → **B**

6) Find all x such that $\frac{(3+x)(4-x)}{1+3x} \geq 0$.

Answer: A $x \leq -3$ or $-\frac{1}{3} < x \leq 4$ B $x \leq -2$ or $-\frac{1}{2} \leq x < \frac{1}{3}$ C $\frac{1}{3} < x \leq 1$ or $x \geq 3$ D $x \leq -\frac{1}{2}$ or $0 < x \leq \frac{2}{3}$ E $x < \frac{1}{3}$ or $\frac{2}{3} \leq x \leq 3$ → **A**

7) Compute the limit $\lim_{x \rightarrow +\infty} e^{2x} - \frac{e^{2x}}{x}$.

Answer: A -1 B e C π D $+\infty$ E $-\infty$ F Does not exist → **D**

8) Compute the limit $\lim_{x \rightarrow 0^-} e^{-3/x} (x^2 - x)$.

Answer: A π B $+\infty$ C $-e$ D $-\infty$ E -1 F Does not exist → **B**

9) Compute the limit $\lim_{x \rightarrow 0^+} 3x^2 + x + \log(x)$.

Answer: A 0 B $-\pi$ C Does not exist D 1 E $+\infty$ F $-\infty$ → **F**

10) Compute the limit $\lim_{x \rightarrow -\infty} \frac{4x^3 + x^2 - x + 1}{-2x^3 + x^2 + 1}$.

Answer: A Does not exist B $-\pi$ C 3 D $+\infty$ E -2 F 0 → **E**

Family name: _____ First name: _____ Matr.no.: _____

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[3]{a^7 b^4} \sqrt[4]{a^2 b^3 c^4}}{(a^3 b^2) \sqrt[3]{b^5 c^2}}$.

Answer: A $\frac{\sqrt[3]{c}}{\sqrt[6]{ab^{19/12}}}$ B $\frac{a^6 \sqrt[6]{b}}{c^{11/6}}$ C $\frac{a^{11/3}}{b^{29/15} c^{7/10}}$ D $\frac{1}{a^2 b^7/5 c^{13/12}}$ E $b^{11/4}$ → **A**

2) Compute all solutions of the system

$$\begin{cases} x - y - 2 = y - 2x \\ -3x - 2y = 4x + 2y. \end{cases}$$

Answer: A $x = -\frac{6}{17}$ and $y = \frac{2}{17}$ B $x = \frac{4}{7}$ and $y = -\frac{2}{7}$ C $x = \frac{4}{13}$ and $y = -\frac{7}{13}$ D $x = -\frac{4}{15}$ and $y = -\frac{2}{15}$ E $x = -\frac{4}{35}$ and $y = \frac{2}{5}$ → **C**

3) Compute all solutions of the inequality $4x^2 < -1 + x + |-x + 1|$.

Answer: A $\frac{1}{2}(3 - \sqrt{5}) < x < \frac{1}{2}(3 + \sqrt{5})$ B No x C $\frac{1}{3}(1 - \sqrt{13}) < x < \frac{1}{3}(1 + \sqrt{13})$ D $\frac{1}{8}(-1 - \sqrt{65}) < x < \frac{1}{8}(\sqrt{65} - 1)$ E $-4 < x < 1$ → **B**

4) Compute all solutions of the system of inequalities

$$\begin{cases} 2 - x \leq x^2 - x \\ 2x - 3 > |-2x - 1|. \end{cases}$$

Answer: A $\sqrt{6} - 2 \leq x < 1$ B $2 < x \leq 1 + \sqrt{2}$ C No x D $x > -\frac{1}{4}$ E $x \geq 1$ → **C**

5) Find the domain of definition of the expression: $\log(-4x^2 + 3x - 3)$.

Answer: A $x > \frac{1}{2}$ B $-\frac{3}{2} < x < 0$ C $x < -1$ or $x > -\frac{1}{3}$ D $\frac{1}{8}(1 - \sqrt{17}) < x < \frac{1}{8}(1 + \sqrt{17})$ E No x → **E**

6) Find all x such that $\frac{1 + 2x}{(2 - 3x)(2 + 3x)} > 0$.

Answer: A $x < -4$ or $-1 < x < \frac{2}{3}$ B $x < -\frac{2}{3}$ or $-\frac{1}{2} < x < \frac{2}{3}$ C $-4 < x < -\frac{3}{2}$ or $x > \frac{2}{3}$ D $x < -1$ or $\frac{2}{3} < x < 1$ E $x < \frac{2}{3}$ or $x > 1$ → **B**

7) Compute the limit $\lim_{x \rightarrow +\infty} e^{-x} - e^{3x} x^3$.

Answer: A $-e$ B -1 C $-\infty$ D Does not exist E 1 F π → **C**

8) Compute the limit $\lim_{x \rightarrow -\infty} \frac{e^{-2/x}(1-x)}{x+2}$.

Answer: A Does not exist B 2 C π D 1 E -1 F $\frac{2}{3}$ → **E**

9) Compute the limit $\lim_{x \rightarrow 0^+} x^2 + 3x - 3 \log(x)$.

Answer: A $-e$ B Does not exist C 1 D $+\infty$ E 2 F $-\pi$ → **D**

10) Compute the limit $\lim_{x \rightarrow +\infty} \frac{4x^3 + 2x^2 - x + 1}{2x^3 + x^2 + 1}$.

Answer: A e B 2 C Does not exist D $-\pi$ E $-\frac{3}{2}$ F $-\frac{1}{2}$ → **B**

Family name:

First name:

Matr.no.:

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{(a^7b^2)\sqrt{a^4b^3c}}{(a^4b^3)\sqrt[5]{bc^4}}$.

Answer: A $\frac{a^5b^{3/10}}{c^{3/10}}$

B $\frac{a^{2/3}c^{8/5}}{b^{13/6}}$

C $a^5b^{5/4}\sqrt{c}$

D $\frac{a^{23/3}}{b^{7/4}\sqrt{c}}$

E $\frac{1}{\sqrt[3]{ab}\sqrt[3]{c}}$

→ **A**

2) Compute all solutions of the system

$$\begin{cases} -5x + 5y + 2 = y - 2x \\ x - 2y = -2x - y. \end{cases}$$

Answer: A $x = -\frac{2}{7}$ and $y = \frac{2}{21}$

B $x = -\frac{2}{13}$ and $y = -\frac{14}{39}$

C $x = -\frac{2}{9}$ and $y = -\frac{2}{3}$

D $x = \frac{2}{3}$ and $y = 1$

E $x = \frac{1}{3}$ and $y = \frac{1}{3}$

→ **C**

3) Compute all solutions of the inequality $|x - 3| + x - 1 > -2x^2$.

Answer: A $x < 1$ or $x > 9$

B All \mathbf{R}

C $x < -\frac{2}{\sqrt{3}}$ or $x > \frac{2}{\sqrt{3}}$

D $x < 1 - \sqrt{3}$ or $x > 1 + \sqrt{3}$

E $\frac{1}{2}(-1 - \sqrt{13}) < x < \frac{1}{2}(\sqrt{13} - 1)$

→ **B**

4) Compute all solutions of the system of inequalities

$$\begin{cases} |x + 3| > 2x + 1 \\ x > -3x^2 - 2x + 2. \end{cases}$$

Answer: A $x < \frac{1}{6}(-3 - \sqrt{33})$ or $\frac{1}{6}(\sqrt{33} - 3) < x < 2$

B $-2 < x < -1$ or $x > -\frac{1}{3}$

C $x < -1$ or $0 < x < \frac{5}{3}$

D $-\frac{5}{3} < x < -1$ or $x > \frac{2}{3}$

E $-3 < x < -1$ or $x > \frac{2}{3}$

→ **A**

5) Find the domain of definition of the expression: $\sqrt{\frac{(-1 - 2x)(2 + x)}{1 - x}}$.

Answer: A $-2 \leq x \leq -\frac{1}{2}$ or $x > 1$

B $-\frac{1}{3} \leq x < 0$ or $x \geq \frac{2}{3}$

C $-1 < x \leq 1$ or $x \geq 2$

D $-4 \leq x < -\frac{2}{3}$ or $x \geq 1$

E $x < -\frac{1}{3}$ or $x \geq \frac{2}{3}$

→ **A**

6) Find all x such that $\frac{1 - x}{(4 + x)(-2 + 3x)} > 0$.

Answer: A $x < -4$ or $0 < x < \frac{3}{2}$

B $x < -4$ or $\frac{2}{3} < x < 1$

C $x < -3$ or $\frac{2}{3} < x < 2$

D $-\frac{3}{2} < x < 0$ or $x > 4$

E $x < \frac{1}{3}$ or $x > \frac{2}{3}$

→ **B**

7) Compute the limit $\lim_{x \rightarrow +\infty} e^x - e^{-x}x^2$.

Answer: A Does not exist

B $-\infty$

C $+\infty$

D 2

E $-\pi$

F -1

→ **C**

8) Compute the limit $\lim_{x \rightarrow 0^-} \frac{e^{-2/x}}{2x^2 + x + 3}$.

Answer: A $-e$

B $+\infty$

C e

D 1

E Does not exist

F 0

→ **B**

9) Compute the limit $\lim_{x \rightarrow 0^+} -x + \frac{3}{x} - 3 \log(x)$.

Answer: A 2

B Does not exist

C $-\pi$

D 1

E $+\infty$

F 0

→ **E**

10) Compute the limit $\lim_{x \rightarrow +\infty} \frac{x^2 - x + 1}{x^2 + 1}$.

Answer: A 0

B $-\frac{3}{2}$

C $-e$

D Does not exist

E 1

F π

→ **E**

Family name: _____ First name: _____ Matr.no.: _____

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[3]{a^3b^3}\sqrt[4]{a^2b^3c^3}}{(a^2b^3)\sqrt[3]{bc^4}}$.

Answer: A $\frac{a^{11/2}}{b^{11/12}c^{7/4}}$ B $\frac{1}{\sqrt{ab^{19/12}c^{7/12}}}$ C $\frac{c^{3/5}}{\sqrt[6]{ab^{53/30}}}$ D $\frac{1}{a^{5/2}b^{11/10}\sqrt{c}}$ E $\frac{1}{a^{8/3}b^{13/6}\sqrt{c}}$ → **B**

2) Compute all solutions of the system

$$\begin{cases} 4x - 4y + 2 = x + 2y \\ y - 3x = x - y. \end{cases}$$

Answer: A $x = -\frac{4}{29}$ and $y = -\frac{14}{29}$ B $x = \frac{2}{9}$ and $y = \frac{4}{9}$ C $x = \frac{2}{11}$ and $y = \frac{14}{11}$ D $x = -\frac{8}{23}$ and $y = \frac{2}{23}$ E $x = \frac{8}{31}$ and $y = -\frac{14}{31}$ → **B**

3) Compute all solutions of the inequality $2|x - 3| + x - 1 \leq x^2$.

Answer: A $x \leq 2$ B $x \leq \frac{1}{2}(-1 - \sqrt{21})$ or $x \geq \frac{1}{2}(\sqrt{21} - 1)$ C $x \geq \frac{1}{3}$ D $x \leq \frac{1}{6}(-5 - \sqrt{61})$ or $x \geq \frac{1}{6}(\sqrt{61} - 5)$ E $\frac{1}{2}(-1 - \sqrt{21}) \leq x \leq \frac{1}{2}(\sqrt{21} - 1)$ → **B**

4) Compute all solutions of the system of inequalities

$$\begin{cases} x + 2 \leq -2x^2 - x \\ x + 1 > |1 - 2x|. \end{cases}$$

Answer: A No x B $x > 1$ or $x \leq 0$ C $x > 4$ D $-\frac{1}{4} < x \leq \frac{1}{2}(1 + \sqrt{5})$ E $0 < x \leq \frac{1}{2}(\sqrt{5} - 1)$ → **A**

5) Find the domain of definition of the expression: $\log\left(\frac{(-2+x)(4+x)}{1+2x}\right)$.

Answer: A $-4 < x < -\frac{1}{2}$ or $x > 2$ B $x < -\frac{1}{2}$ or $\frac{1}{2} < x < 3$ C $-1 < x < -\frac{1}{2}$ D $-4 < x < -\frac{3}{2}$ or $x > 0$ E $x < -2$ or $-\frac{3}{2} < x < 0$ → **A**

6) Find all x such that $\frac{(-1+x)(3-3x)}{2+3x} < 0$.

Answer: A $x < -3$ or $x > 0$ B $x < -3$ or $-1 < x < -\frac{1}{3}$ C $x < -\frac{1}{2}$ or $-\frac{1}{3} < x < 3$ D $x < -\frac{5}{3}$ or $-\frac{2}{3} < x < 1$ E $-\frac{2}{3} < x < 1$ or $x > 1$ → **E**

7) Compute the limit $\lim_{x \rightarrow -\infty} \frac{e^{-2x}}{x^2} - \frac{e^{3x}}{x}$.

Answer: A $+\infty$ B 1 C e D $-\infty$ E π F Does not exist → **A**

8) Compute the limit $\lim_{x \rightarrow \frac{3}{5}^-} \frac{e^{-1/x}}{5x - 3}$.

Answer: A $-\pi$ B $+\infty$ C Does not exist D 2 E π F $-\infty$ → **F**

9) Compute the limit $\lim_{x \rightarrow 0^+} -\frac{3}{x^4} - x - 3 \log(x)$.

Answer: A 2 B $+\infty$ C e D Does not exist E $-\infty$ F -1 → **E**

10) Compute the limit $\lim_{x \rightarrow -\infty} \frac{2x^3 + 2x^2 + 1}{x^2 - 2x^3}$.

Answer: A $\frac{1}{2}$ B 1 C $-\frac{1}{2}$ D Does not exist E -1 F π → **E**

Family name:

First name:

Matr.no.:

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[5]{a^7 b^5} \sqrt[6]{a^2 b^3 c^4}}{(a^3 b^3) \sqrt[3]{bc^6}}$.

Answer: A $\frac{\sqrt[12]{c}}{a^{5/6} b^{17/6}}$ B $\frac{c^{3/2}}{\sqrt[3]{ab^{19/12}}}$ C $\frac{a^{23/3} \sqrt[6]{b}}{\sqrt[6]{c}}$ D $\frac{a^{7/5} c^{4/3}}{b^{3/2}}$ E $\frac{1}{a^{19/15} b^{11/6} c^{4/3}}$ → **E**

2) Compute all solutions of the system

$$\begin{cases} x + 2y + 2 = y - 2x \\ y - 3x = 4x - 2y. \end{cases}$$

Answer: A $x = -\frac{2}{25}$ and $y = -\frac{14}{25}$ B $x = -\frac{6}{35}$ and $y = \frac{2}{5}$ C $x = -\frac{3}{8}$ and $y = -\frac{7}{8}$ D $x = \frac{3}{5}$ and $y = -\frac{4}{5}$ E $x = \frac{2}{3}$ and $y = -\frac{14}{9}$ → **C**

3) Compute all solutions of the inequality $-3|x-1| - x - 1 > x^2$.

Answer: A -1 B $x < \frac{1}{3}$ or $x > 3$ C $x < \frac{1}{2}(1 - \sqrt{5})$ or $x > \frac{1}{2}(1 + \sqrt{5})$ D $x < -3$ or $x > 1$ E No x → **E**

4) Compute all solutions of the system of inequalities

$$\begin{cases} |x+1| + 2x \leq 1 \\ x^2 - 2x + 2 > x + 2. \end{cases}$$

Answer: A $0 < x < 4$ B $x > 0$ C $-4 \leq x < -1$ D $x < 0$ E $x \geq \frac{5}{3}$ → **D**

5) Find the domain of definition of the expression: $\log\left(\frac{(-1+2x)(2+x)}{1+2x}\right)$.

Answer: A $-2 < x < -\frac{1}{2}$ or $x > \frac{1}{2}$ B $-4 < x < \frac{1}{2}$ or $x > 3$ C $\frac{1}{4} < x < \frac{1}{2}$ or $x > 4$ D $x < -4$ or $-3 < x < 0$ E $x < -\frac{1}{4}$ or $x > 2$ → **A**

6) Find all x such that $\frac{(1+x)(2-3x)}{1+3x} < 0$.

Answer: A $-\frac{1}{2} < x < 0$ or $x > 1$ B $x < -1$ or $-\frac{1}{3} < x < 3$ C $-1 < x < -\frac{1}{3}$ or $x > \frac{2}{3}$ D $\frac{2}{3} < x < 1$ E $-2 < x < -1$ or $x > \frac{2}{3}$ → **C**

7) Compute the limit $\lim_{x \rightarrow +\infty} e^{-x} - \frac{e^{2x}}{x^3}$.

Answer: A $-\infty$ B 2 C $-e$ D 1 E π F Does not exist → **A**

8) Compute the limit $\lim_{x \rightarrow 0^+} \frac{e^{-2/x}(-x-2)}{x+2}$.

Answer: A Does not exist B 0 C $-\pi$ D 2 E -1 F e → **B**

9) Compute the limit $\lim_{x \rightarrow 0^+} -3x^2 - x + \log(x)$.

Answer: A 1 B Does not exist C π D 2 E e F $-\infty$ → **F**

10) Compute the limit $\lim_{x \rightarrow +\infty} \frac{3x^2 + x + 1}{-2x^3 + x^2 + 1}$.

Answer: A Does not exist B 0 C -1 D π E 3 F $\frac{3}{2}$ → **B**

Family name:

First name:

Matr.no.:

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[3]{a^3b^3}\sqrt{a^2b^2c^2}}{(a^4b^3)\sqrt[4]{bc^4}}$.

Answer: A $\frac{a^{4/3}b^{7/15}}{c^{7/10}}$

B $\frac{1}{\sqrt{ab^2c^{13/12}}}$

C $\frac{1}{a^2b^{5/4}}$

D $\frac{a^{2/3}}{\sqrt[6]{c}}$

E $\frac{\sqrt{c}}{a^{2/5}b^{7/4}}$

→ C

2) Compute all solutions of the system

$$\begin{cases} 4x + 2y - 2 = x + y \\ -3x - 2y = 4x + y. \end{cases}$$

Answer: A $x = 3$ and $y = -7$

B $x = \frac{2}{7}$ and $y = 1$

C $x = -\frac{4}{21}$ and $y = \frac{2}{7}$

D $x = -\frac{4}{9}$ and $y = -\frac{2}{9}$

E $x = \frac{1}{3}$ and $y = \frac{7}{9}$

→ A

3) Compute all solutions of the inequality $-2x^2 + |-x + 2| \geq -3x - 4$.

Answer: A $x \leq 0$ or $x \geq 1$

B $x \leq \frac{1}{4}(-1 - \sqrt{17})$ or $x \geq -\frac{1}{2}$

C $\frac{1}{2}(1 - \sqrt{13}) \leq x \leq 1 + \sqrt{2}$

D $-1 \leq x \leq 1 + \sqrt{3}$

E $x \leq 6$

→ C

4) Compute all solutions of the system of inequalities

$$\begin{cases} |x + 1| + 2x \leq 1 \\ x^2 + x + 2 > 2 - 3x. \end{cases}$$

Answer: A $x > 3$

B $x < -4$

C $x > 0$

D $0 < x < 1$

E $x \leq -5$

→ B

5) Find the domain of definition of the expression: $\sqrt{\frac{(1-x)(3-3x)}{1+3x}}$.

Answer: A $x < -2$ or $-\frac{3}{2} \leq x \leq 4$

B $-2 \leq x < 2$ or $x \geq 4$

C $x > -\frac{1}{3}$

D $-\frac{1}{3} \leq x < \frac{1}{3}$ or $x \geq \frac{4}{3}$

E $-2 < x \leq 2$ or $x \geq 3$

→ C

6) Find all x such that $\frac{(3-x)(2-3x)}{3x} \geq 0$.

Answer: A $-3 \leq x < \frac{2}{3}$ or $x \geq 2$

B $-3 \leq x \leq -\frac{3}{2}$ or $x > 0$

C $x \leq -\frac{1}{2}$ or $0 < x \leq \frac{2}{3}$

D $\frac{1}{2} \leq x < \frac{2}{3}$ or $x \geq 4$

E $0 < x \leq \frac{2}{3}$ or $x \geq 3$

→ E

7) Compute the limit $\lim_{x \rightarrow +\infty} \frac{e^{-3x}}{x} - e^{3x}x$.

Answer: A e

B $-\infty$

C 2

D -1

E Does not exist

F 0

→ B

8) Compute the limit $\lim_{x \rightarrow 0^-} \frac{e^{2/x}(2x-2)}{3x-1}$.

Answer: A $-\pi$

B 0

C 1

D 2

E Does not exist

F $-e$

→ B

9) Compute the limit $\lim_{x \rightarrow 0^+} -x^2 + x - \log(x)$.

Answer: A 1

B $+\infty$

C -1

D Does not exist

E $-\infty$

F 0

→ B

10) Compute the limit $\lim_{x \rightarrow +\infty} \frac{-4x^3 + 2x^2 + 1}{x^2 - 4x^3}$.

Answer: A -1

B 1

C Does not exist

D $+\infty$

E 2

F $-e$

→ B

Family name: _____ First name: _____ Matr.no.: _____

For each question, choose ONE answer and write ONLY the letter of that answer at the end of the arrow

1) Simplify the following expression: $\frac{\sqrt[5]{a^7 b^5} \sqrt{a^2 b^4 c^3}}{(a^3 b^2) \sqrt[3]{bc^6}}$.

Answer: A $\frac{a^{5/6}}{b^{13/30} \sqrt[5]{c}}$ B $\frac{a^{19/3}}{b^{5/2} c^{31/30}}$ C $\frac{b^{2/3}}{a^{3/5} \sqrt{c}}$ D $\frac{1}{\sqrt[3]{ab^{11/6} c^{3/2}}}$ E $\frac{1}{a^{12/5} b^{8/15} \sqrt{c}}$ → **C**

2) Compute all solutions of the system

$$\begin{cases} -2x + 2y - 2 = x + y \\ y - 3x = x + 2y. \end{cases}$$

Answer: A $x = \frac{2}{11}$ and $y = \frac{14}{33}$ B $x = 2$ and $y = 7$ C $x = -\frac{2}{7}$ and $y = \frac{8}{7}$ D $x = \frac{2}{7}$ and $y = -\frac{8}{7}$ → **C**
 E $x = -\frac{2}{11}$ and $y = \frac{8}{33}$

3) Compute all solutions of the inequality $-2|x+1| + x - 1 > -2x^2$.

Answer: A $x < -\frac{1}{3}$ B $x < \frac{1}{2}(5 - 3\sqrt{5})$ or $x > \frac{1}{2}(5 + 3\sqrt{5})$ C $x < -1$ or $x > \frac{3}{2}$ D $x < -1$ or $x > \frac{1}{2}$ → **C**
 E $-4 < x < \sqrt{3} - 1$

4) Compute all solutions of the system of inequalities

$$\begin{cases} |x+3| - 2x \leq 1 \\ x^2 + x + 2 > x + 2. \end{cases}$$

Answer: A $x \geq 1$ B $x > 0$ C $x \geq 5$ D $x \geq 2$ E $-3 < x \leq -\frac{2}{3}$ → **D**

5) Find the domain of definition of the expression: $\log\left(\frac{(-3-x)(3+x)}{1-4x}\right)$.

Answer: A $x < -3$ or $-1 < x < \frac{3}{2}$ B $x > \frac{1}{4}$ C $-\frac{1}{2} < x < 2$ or $x > 4$ D 2 E $\frac{1}{2} < x < 1$ or $x > \frac{3}{2}$ → **B**

6) Find all x such that $\frac{-3-2x}{(5+x)(3x)} \leq 0$.

Answer: A $x < -1$ or $x > \frac{1}{3}$ B $x < -\frac{1}{3}$ or $1 \leq x < 4$ C $x \leq -\frac{3}{2}$ or $\frac{1}{3} < x < 3$ D $-\frac{3}{2} \leq x < -\frac{1}{3}$ or $x > 5$ → **E**
 E $-5 < x \leq -\frac{3}{2}$ or $x > 0$

7) Compute the limit $\lim_{x \rightarrow +\infty} e^{-2x} - \frac{e^{2x}}{x}$.

Answer: A $-\infty$ B $+\infty$ C $-\pi$ D Does not exist E 2 F 0 → **A**

8) Compute the limit $\lim_{x \rightarrow 0^+} \frac{e^{\frac{1}{x}}}{-x^2 - x + 1}$.

Answer: A Does not exist B π C $\frac{1}{2}$ D $-\pi$ E $+\infty$ F 0 → **E**

9) Compute the limit $\lim_{x \rightarrow +\infty} \frac{5}{x^4} - 3x - \log(x)$.

Answer: A π B 2 C $+\infty$ D $-\infty$ E $-\pi$ F Does not exist → **D**

10) Compute the limit $\lim_{x \rightarrow -\infty} \frac{2x^2 - 2x + 1}{4x^3 + x^2 + 1}$.

Answer: A Does not exist B 3 C 1 D $-\infty$ E $+\infty$ F 0 → **F**

SOLUZIONI

↓Testo\Domanda→	1	2	3	4	5	6	7	8	9	10
I	E	D	B	B	A	E	A	F	B	D
II	C	A	E	E	D	E	B	D	F	F
III	E	A	C	D	A	E	E	C	C	B
IV	A	B	D	D	A	A	A	E	A	A
V	A	A	A	A	B	A	F	D	F	D
VI	D	C	C	B	E	E	A	F	A	E
VII	C	C	A	E	E	B	A	E	D	D
VIII	B	C	A	B	C	B	F	A	F	D
IX	C	E	C	A	E	E	E	E	F	D
X	B	A	D	B	A	A	F	C	C	F
XI	A	E	D	C	D	D	C	F	D	B
XII	D	E	E	E	B	C	E	C	E	B
XIII	C	D	E	A	D	B	F	C	D	F
XIV	A	E	C	C	A	A	A	E	C	F
XV	D	D	E	C	E	C	D	F	D	C
XVI	C	A	E	B	D	B	A	F	C	C
XVII	C	E	C	A	C	C	F	D	E	D
XVIII	E	E	E	A	B	E	D	B	E	E
XIX	B	C	B	A	B	E	D	D	D	B
XX	E	D	D	C	E	A	F	D	C	F
XXI	B	C	A	E	A	B	C	D	D	D
XXII	C	A	C	D	B	B	A	E	C	A
XXIII	E	A	D	E	E	B	C	F	B	A
XXIV	A	C	B	D	B	A	D	B	F	E
XXV	A	C	B	C	E	B	C	E	D	B
XXVI	A	C	B	A	A	B	C	B	E	E
XXVII	B	B	B	A	A	E	A	F	E	E
XXVIII	E	C	E	D	A	C	A	B	F	B
XXIX	C	A	C	B	C	E	B	B	B	B
XXX	C	C	C	D	B	E	A	E	D	F