6. (10p) If $L = \lim_{n\to+\infty} \frac{3+6+9+\ldots+3(n-1)}{n^2+5}$, then L is:

a. $\frac{5}{2}$
b. 1
c. 2
d. 3
e. $\frac{3}{2}$

7. (10p) Let $f: \boldsymbol{R} \to \boldsymbol{R}$, $f(x) = \begin{cases} a\,ln(3-x), & x \le 1 \\ \frac{2^x-2}{x-1}, & x > 1 \end{cases}$, with $a \in \boldsymbol{R}^*$. The value of the parameter a such that f is continuous at $x = 1$ is:

a. 1
b. 0.5
c. $ln2$
d. $ln3$
e. 2

8. (10p) Let $f: [0,+\infty) \to (0,+\infty)$ such that $f(x) + f(1-x) = 1$ for all $x \in [0,+\infty)$ and the sequences of real numbers $a_n = \sum_{k=1}^{n-1} f\left(\frac{n-k}{n}\right)$, $b_n = ln\frac{a_n}{n}, n \ge 3$. If $L = \lim_{n\to+\infty} b_n$, then L is:

a. 0
b. $ln\frac{1}{2}$
c. ∞
d. 1
e. $ln2$

9. (5p) Let $f: \boldsymbol{R} \to \boldsymbol{R}, f(x) = x^2 + mx + n$, such that the image of f verifies $Im\,f = [-\frac{9}{4}, +\infty)$ and f has the global extreme point at $x = 2.5$. If $S = m + n$, then S is:

a. 1
b. 0
c. -1
d. 2
e. -2

10. (5p) Consider the system of equations

$$\begin{cases} mx + m^2y - z = m^2 \\ x - my + z = 2 \\ x - y + z = -1 \end{cases}, \qquad \text{where } m \in \boldsymbol{R}.$$

The system is incompatible for:

a. $m = -1$
b. $m = 0$
c. $m \neq -1$
d. $m \neq 1$
e. $m = 1$

MULTIPLE-CHOICE TEST
in MATHEMATICS

1. (10p) Let $f:[0,3] \to \boldsymbol{R},\ f(x)=\begin{cases} 2x\,, & x \in [0,1] \\ x^2+2x\,, & x \in (1,3] \end{cases}$. Then $\int_0^2 f(x)\,\mathrm{d}x$ is equal to:

a. $\frac{17}{3}$
b. $\frac{20}{3}$
c. $\frac{19}{3}$
d. $\frac{19}{2}$
e. $\frac{53}{3}$

2. (10p) The definite integral $\int_0^2 \left(\frac{3x-1}{x^2-2x-3}\right)\mathrm{d}x$ is equal to:

a. $-ln3$
b. $5ln5$
c. $3ln5$
d. $-5+ln5$
e. $5ln3$

3. (10p) Let $f:\boldsymbol{R} \to \boldsymbol{R},\ f(x)=e^{-mx}, m \in \boldsymbol{R}^*$. Then $f''(x)+4f'(x)+3f(x)<0$ if and only if:

a. $m \in (2,3)$
b. $m \in (1,2)$
c. $m \in (0,3)$
d. $m \in (1,3)$
e. $m \in (1,4)$

4. (10p) Let $f:\boldsymbol{R} \to \boldsymbol{R},\ f(x)=\begin{cases} e^{ax}+1, & x<0 \\ ln(x+1)+b\,, & x \geq 0 \end{cases}$, with $a,b \in \boldsymbol{R}$.

If $A=\{(a,b) \in \boldsymbol{R}^2 \mid f \text{ admits a derivative on } \boldsymbol{R}\}$ and $S=\sum_{(a,b)\in A}(a^2+b^2)$, then:

a. $S=15$
b. $S=10$
c. $S=13$
d. $S=17$
e. $S=5$

5. (10p) The abscisse of the minimum point of the function

$$f:\boldsymbol{R} \to \boldsymbol{R},\ f(x)=max\{x+2,-2x+2\}$$

is equal to:

a. $x=0$
b. $x=-1$
c. $x=\frac{3}{2}$
d. $x=1$
e. $x=4$

MULTIPLE-CHOICE TEST
in MATHEMATICS

1. (10p) Let $f: \boldsymbol{R} \to \boldsymbol{R},\ f(x) = \begin{cases} a\, ln(3-x), & x \le 1 \\ \frac{2^x - 2}{x-1}, & x > 1 \end{cases}$, with $a \in \boldsymbol{R}^*$. The value of the parameter a such that f is continuous at $x = 1$ is:

a. 0.5
b. 1
c. 2
d. $ln2$
e. $ln3$

2. (10p) Let $f: [0,3] \to \boldsymbol{R},\ f(x) = \begin{cases} 2x, & x \in [0,1] \\ x^2 + 2x, & x \in (1,3] \end{cases}$. Then $\int_0^2 f(x)\,\mathrm{d}x$ is equal to:

a. $\frac{20}{3}$
b. $\frac{17}{3}$
c. $\frac{19}{2}$
d. $\frac{19}{3}$
e. $\frac{53}{3}$

3. (10p) Let $f: \boldsymbol{R} \to \boldsymbol{R},\ f(x) = e^{-mx}, m \in \boldsymbol{R}^*$. Then $f''(x) + 4f'(x) + 3f(x) < 0$ if and only if:

a. $m \in (1,3)$
b. $m \in (1,2)$
c. $m \in (0,3)$
d. $m \in (2,3)$
e. $m \in (1,4)$

4. (10p) Let $f: [0,+\infty) \to (0,+\infty)$ such that $f(x) + f(1-x) = 1$ for all $x \in [0,+\infty)$ and the sequences of real numbers $a_n = \sum_{k=1}^{n-1} f\left(\frac{n-k}{n}\right)$, $b_n = ln\frac{a_n}{n}, n \ge 3$. If $L = \lim_{n\to+\infty} b_n$, then L is:

a. 0
b. $ln2$
c. ∞
d. $ln\frac{1}{2}$
e. 1

5. (10p) The abscisse of the minimum point of the function

$$f: \boldsymbol{R} \to \boldsymbol{R},\ f(x) = max\{x+2, -2x+2\}$$

is equal to:

a. $x = 4$
b. $x = -1$
c. $x = 0$
d. $x = \frac{3}{2}$
e. $x = 1$

6. (10p) The definite integral $\int_0^2 \left(\frac{3x-1}{x^2 - 2x - 3}\right) dx$ is equal to:

a. $5ln3$
b. $3ln5$
c. $-ln3$
d. $-5+ln5$
e. $5ln5$

7. (10p) If $L = \lim_{n\to+\infty} \frac{3+6+9+\ldots+3(n-1)}{n^2+5}$, then L is:

a. $\frac{5}{2}$
b. $\frac{3}{2}$
c. 1
d. 3
e. 2

8. (5p) Consider the system of equations

$$\begin{cases} mx + m^2y - z = m^2 \\ x - my + z = 2 \\ x - y + z = -1 \end{cases}, \qquad \text{where } m \in \boldsymbol{R}.$$

The system is incompatible for:

a. $m \neq 1$
b. $m = 1$
c. $m \neq -1$
d. $m = -1$
e. $m = 0$

9. (5p) Let $f: \boldsymbol{R} \to \boldsymbol{R}, f(x) = x^2 + mx + n$, such that the image of f verifies $Im\, f = [-\frac{9}{4}, +\infty)$ and f has the global extreme point at $x = 2.5$. If $S = m + n$, then S is:

a. 1
b. 2
c. 0
d. -2
e. -1

10. (10p) Let $f: \boldsymbol{R} \to \boldsymbol{R},\ f(x) = \begin{cases} e^{ax} + 1, & x < 0 \\ ln(x+1) + b, & x \geq 0 \end{cases}$, with $a, b \in \boldsymbol{R}$.

If $A = \{(a,b) \in \boldsymbol{R}^2 \mid f \text{ admits a derivative on } \boldsymbol{R}\}$ and $S = \sum_{(a,b)\in A}(a^2 + b^2)$, then:

a. $S = 5$
b. $S = 10$
c. $S = 15$
d. $S = 13$
e. $S = 17$

MULTIPLE-CHOICE TEST
in MATHEMATICS

1. (10p) Let $f:[0,+\infty)\to(0,+\infty)$ such that $f(x)+f(1-x)=1$ for all $x\in[0,+\infty)$ and the sequences of real numbers $a_n=\sum_{k=1}^{n-1} f\left(\frac{n-k}{n}\right)$, $b_n=ln\frac{a_n}{n}, n\geq 3$. If $L=\lim\limits_{n\to+\infty} b_n$, then L is:

a. $ln\frac{1}{2}$
b. ∞
c. 0
d. 1
e. $ln2$

2. (10p) The definite integral $\int_0^2\left(\frac{3x-1}{x^2-2x-3}\right)\mathrm{d}x$ is equal to:

a. $3ln5$
b. $5ln5$
c. $-ln3$
d. $-5+ln5$
e. $5ln3$

3. (5p) Consider the system of equations

$$\begin{cases} mx+m^2y-z=m^2 \\ x-my+z=2 \\ x-y+z=-1 \end{cases}, \qquad \text{where } m\in \boldsymbol{R}.$$

The system is incompatible for:

a. $m=0$
b. $m=-1$
c. $m\neq -1$
d. $m=1$
e. $m\neq 1$

4. (10p) Let $f:\boldsymbol{R}\to\boldsymbol{R},\ f(x)=\begin{cases} e^{ax}+1, & x<0 \\ ln(x+1)+b, & x\geq 0 \end{cases}$, with $a,b\in\boldsymbol{R}$.

If $A=\{(a,b)\in\boldsymbol{R}^2 \mid f \text{ admits a derivative on } \boldsymbol{R}\}$ and $S=\sum_{(a,b)\in A}(a^2+b^2)$, then:

a. $S=15$
b. $S=5$
c. $S=10$
d. $S=17$
e. $S=13$

5. (10p) Let $f:\boldsymbol{R}\to\boldsymbol{R}$, $f(x)=e^{-mx}, m\in\boldsymbol{R}^*$. Then $f''(x)+4f'(x)+3f(x)<0$ if and only if:

a. $m\in(2,3)$
b. $m\in(1,3)$
c. $m\in(0,3)$
d. $m\in(1,2)$
e. $m\in(1,4)$

6. (10p) If $L=\lim\limits_{n\to+\infty}\frac{3+6+9+\ldots+3(n-1)}{n^2+5}$, then L is:

a. 1
b. $\frac{5}{2}$
c. $\frac{3}{2}$
d. 2
e. 3

7. (10p) The abscisse of the minimum point of the function

$$f: \mathbf{R} \to \mathbf{R},\ f(x) = max\{x+2, -2x+2\}$$

is equal to:

a. $x = \frac{3}{2}$
b. $x = -1$
c. $x = 1$
d. $x = 0$
e. $x = 4$

8. (10p) Let $f: \mathbf{R} \to \mathbf{R},\ f(x) = \begin{cases} a\,ln(3-x), & x \leq 1 \\ \frac{2^x - 2}{x-1}, & x > 1 \end{cases}$, with $a \in \mathbf{R}^*$. The value of the parameter a such that f is continuous at $x = 1$ is:

a. 2
b. 0.5
c. 1
d. $ln2$
e. $ln3$

9. (5p) Let $f: \mathbf{R} \to \mathbf{R}, f(x) = x^2 + mx + n$, such that the image of f verifies $Im\,f = [-\frac{9}{4}, +\infty)$ and f has the global extreme point at $x = 2.5$. If $S = m + n$, then S is:

a. 0
b. 1
c. 2
d. -1
e. -2

10. (10p) Let $f: [0,3] \to \mathbf{R},\ f(x) = \begin{cases} 2x, & x \in [0,1] \\ x^2 + 2x, & x \in (1,3] \end{cases}$. Then $\int_0^2 f(x)\,\mathrm{d}x$ is equal to:

a. $\frac{19}{2}$
b. $\frac{17}{3}$
c. $\frac{20}{3}$
d. $\frac{53}{3}$
e. $\frac{19}{3}$

BUCHAREST UNIVERSITY OF ECONOMIC STUDIES
FACULTY OF ECONOMIC CYBERNETICS, STATISTICS AND INFORMATICS Test code: ***MEna4***
Admission: ***Undergraduate programme, September 2026***

MULTIPLE-CHOICE TEST
in MATHEMATICS

1. (5p) Consider the system of equations

$$\begin{cases} mx + m^2 y - z = m^2 \\ x - my + z = 2 \\ x - y + z = -1 \end{cases}, \quad \text{where } m \in \boldsymbol{R}.$$

The system is incompatible for:

a. $m \neq 1$
b. $m = 0$
c. $m = 1$
d. $m \neq -1$
e. $m = -1$

2. (10p) Let $f: [0,3] \to \boldsymbol{R}$, $f(x) = \begin{cases} 2x, & x \in [0,1] \\ x^2 + 2x, & x \in (1,3] \end{cases}$. Then $\int_0^2 f(x)\,dx$ is equal to:

a. $\frac{19}{2}$
b. $\frac{20}{3}$
c. $\frac{19}{3}$
d. $\frac{17}{3}$
e. $\frac{53}{3}$

3. (10p) The abscisse of the minimum point of the function

$$f: \boldsymbol{R} \to \boldsymbol{R},\ f(x) = max\{x+2, -2x+2\}$$

is equal to:

a. $x = 1$
b. $x = -1$
c. $x = \frac{3}{2}$
d. $x = 4$
e. $x = 0$

4. (10p) The definite integral $\int_0^2 \left(\frac{3x-1}{x^2-2x-3}\right) dx$ is equal to:

a. $3ln5$
b. $-ln3$
c. $-5 + ln5$
d. $5ln3$
e. $5ln5$

5. (10p) If $L = \lim\limits_{n\to+\infty} \frac{3+6+9+\ldots+3(n-1)}{n^2+5}$, then L is:

a. 2
b. $\frac{5}{2}$
c. 1

d. $\frac{3}{2}$
e. 3

6. (10p) Let $f: \boldsymbol{R} \to \boldsymbol{R},\ f(x) = \begin{cases} a\, ln(3-x), & x \le 1 \\ \frac{2^x - 2}{x-1}, & x > 1 \end{cases}$, with $a \in \boldsymbol{R}^*$. The value of the parameter a such that f is continuous at $x = 1$ is:

a. 0.5
b. 1
c. $ln3$
d. 2
e. $ln2$

7. (10p) Let $f: \boldsymbol{R} \to \boldsymbol{R}$, $f(x) = e^{-mx}, m \in \boldsymbol{R}^*$. Then $f''(x) + 4f'(x) + 3f(x) < 0$ if and only if:

a. $m \in (1,3)$
b. $m \in (1,2)$
c. $m \in (0,3)$
d. $m \in (1,4)$
e. $m \in (2,3)$

8. (5p) Let $f: \boldsymbol{R} \to \boldsymbol{R}, f(x) = x^2 + mx + n$, such that the image of f verifies $Im\, f = [-\frac{9}{4}, +\infty)$ and f has the global extreme point at $x = 2.5$. If $S = m + n$, then S is:

a. 1
b. -1
c. 2
d. -2
e. 0

R $\cancel{[0,1]}$ $\cancel{[0,1]}$

9. (10p) Let $f: \cancel{[0,+\infty)} \to (0,+\infty)$ such that $f(x) + f(1-x) = 1$ for all $x \in \cancel{[0,+\infty)}$ and the sequences of real numbers $a_n = \sum_{k=1}^{n-1} f\left(\frac{n-k}{n}\right)$, $b_n = ln\frac{a_n}{n}, n \ge 3$. If $L = \lim\limits_{n\to+\infty} b_n$, then L is:

a. 0
b. 1
c. ∞
d. $ln2$
e. $ln\frac{1}{2}$

10. (10p) Let $f: \boldsymbol{R} \to \boldsymbol{R},\ f(x) = \begin{cases} e^{ax} + 1, & x < 0 \\ ln(x+1) + b, & x \ge 0 \end{cases}$, with $a, b \in \boldsymbol{R}$.

If $A = \{(a,b) \in \boldsymbol{R}^2 \mid f$ admits a derivative on $\boldsymbol{R}\}$ and $S = \sum_{(a,b)\in A}(a^2 + b^2)$, then:

a. $S = 15$
b. $S = 5$
c. $S = 13$
d. $S = 17$
e. $S = 10$

MULTIPLE-CHOICE TEST
in MATHEMATICS

1. (10p) The definite integral $\int_0^2 \left(\frac{3x-1}{x^2-2x-3}\right) \mathrm{d}x$ is equal to:

a. $5ln5$
b. $-5+ln5$
c. $-ln3$
d. $5ln3$
e. $3ln5$

2. (10p) The abscisse of the minimum point of the function

$$f: \boldsymbol{R} \to \boldsymbol{R},\ f(x) = max\{x+2, -2x+2\}$$

is equal to:

a. $x=-1$
b. $x=4$
c. $x=\frac{3}{2}$
d. $x=1$
e. $x=0$

3. (10p) Let $f: [0,3] \to \boldsymbol{R},\ f(x) = \begin{cases} 2x\,, & x \in [0,1] \\ x^2+2x\,, & x \in (1,3] \end{cases}$. Then $\int_0^2 f(x)\,\mathrm{d}x$ is equal to:

a. $\frac{17}{3}$
b. $\frac{19}{3}$
c. $\frac{19}{2}$
d. $\frac{53}{3}$
e. $\frac{20}{3}$

4. (10p) If $L = \lim\limits_{n\to+\infty} \frac{3+6+9+\ldots+3(n-1)}{n^2+5}$, then L is:

a. 1
b. $\frac{5}{2}$
c. 2
d. $\frac{3}{2}$
e. 3

5. (10p) Let $f: \boldsymbol{R} \to \boldsymbol{R},\ f(x) = \begin{cases} a\,ln(3-x), & x \le 1 \\ \frac{2^x-2}{x-1}\,, & x > 1 \end{cases}$, with $a \in \boldsymbol{R}^*$. The value of the parameter a such that f is continuous at $x=1$ is:

a. $ln3$
b. 1
c. 0.5
d. 2
e. $ln2$

6. (5p) Consider the system of equations

$$\begin{cases} mx + m^2y - z = m^2 \\ x - my + z = 2 \\ x - y + z = -1 \end{cases}, \quad \text{where } m \in \boldsymbol{R}.$$

The system is incompatible for:

a. $m = 0$
b. $m = -1$
c. $m = 1$
d. $m \neq -1$
e. $m \neq 1$

7. (10p) Let $f: \boldsymbol{R} \to \boldsymbol{R}$, $f(x) = e^{-mx}, m \in \boldsymbol{R}^*$. Then $f''(x) + 4f'(x) + 3f(x) < 0$ if and only if:

a. $m \in (0,3)$
b. $m \in (2,3)$
c. $m \in (1,2)$
d. $m \in (1,4)$
e. $m \in (1,3)$

8. (10p) Let $f: [0,+\infty) \to (0,+\infty)$ such that $f(x) + f(1-x) = 1$ for all $x \in [0,+\infty)$ and the sequences of real numbers $a_n = \sum_{k=1}^{n-1} f\left(\frac{n-k}{n}\right)$, $b_n = ln\frac{a_n}{n}, n \geq 3$. If $L = \lim_{n\to+\infty} b_n$, then L is:

a. $ln\frac{1}{2}$
b. 0
c. $ln2$
d. ∞
e. 1

9. (10p) Let $f: \boldsymbol{R} \to \boldsymbol{R}$, $f(x) = \begin{cases} e^{ax} + 1, & x < 0 \\ ln(x+1) + b, & x \geq 0 \end{cases}$, with $a, b \in \boldsymbol{R}$.

If $A = \{(a,b) \in \boldsymbol{R}^2 \mid f \text{ admits a derivative on } \boldsymbol{R}\}$ and $S = \sum_{(a,b)\in A}(a^2 + b^2)$, then:

a. $S = 5$
b. $S = 10$
c. $S = 15$
d. $S = 17$
e. $S = 13$

10. (5p) Let $f: \boldsymbol{R} \to \boldsymbol{R}, f(x) = x^2 + mx + n$, such that the image of f verifies $Im\, f = [-\frac{9}{4}, +\infty)$ and f has the global extreme point at $x = 2.5$. If $S = m + n$, then S is:

a. 0
b. 1
c. 2
d. -1
e. -2

MULTIPLE-CHOICE TEST
in MATHEMATICS

1. (5p) Let $f: \boldsymbol{R} \to \boldsymbol{R}, f(x) = x^2 + mx + n$, such that the image of f verifies $Im\, f = [-\frac{9}{4}, +\infty)$ and f has the global extreme point at $x = 2.5$. If $S = m + n$, then S is:

a. -1
b. 0
c. 2
d. -2
e. 1

2. (10p) Let $f: \boldsymbol{R} \to \boldsymbol{R},\ f(x) = \begin{cases} a\, ln(3-x), & x \leq 1 \\ \frac{2^x - 2}{x-1}, & x > 1 \end{cases}$, with $a \in \boldsymbol{R}^*$. The value of the parameter a such that f is continuous at $x = 1$ is:

a. $ln2$
b. 1
c. 0.5
d. 2
e. $ln3$

3. (10p) Let $f: \boldsymbol{R} \to \boldsymbol{R},\ f(x) = \begin{cases} e^{ax} + 1, & x < 0 \\ ln(x+1) + b, & x \geq 0 \end{cases}$, with $a, b \in \boldsymbol{R}$.
If $A = \{(a,b) \in \boldsymbol{R}^2 \mid f \text{ admits a derivative on } \boldsymbol{R}\}$ and $S = \sum_{(a,b)\in A}(a^2 + b^2)$, then:

a. $S = 15$
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d. $S = 10$
e. $S = 17$

4. (10p) Let $f: \boldsymbol{R} \to \boldsymbol{R}, f(x) = e^{-mx}, m \in \boldsymbol{R}^*$. Then $f''(x) + 4f'(x) + 3f(x) < 0$ if and only if:

a. $m \in (2,3)$
b. $m \in (0,3)$
c. $m \in (1,2)$
d. $m \in (1,4)$
e. $m \in (1,3)$

5. (10p) Let $f: [0,3] \to \boldsymbol{R},\ f(x) = \begin{cases} 2x, & x \in [0,1] \\ x^2 + 2x, & x \in (1,3] \end{cases}$. Then $\int_0^2 f(x)\, dx$ is equal to:

a. $\frac{20}{3}$
b. $\frac{17}{3}$
c. $\frac{19}{2}$
d. $\frac{19}{3}$
e. $\frac{53}{3}$

6. (10p) If $L = \lim_{n\to+\infty} \frac{3+6+9+\ldots+3(n-1)}{n^2+5}$, then L is:

a. 1
b. $\frac{5}{2}$
c. 3
d. $\frac{3}{2}$
e. 2

7. (10p) The abscisse of the minimum point of the function

$$f: \boldsymbol{R} \to \boldsymbol{R},\ f(x) = max\{x+2, -2x+2\}$$

is equal to:

a. $x = 1$
b. $x = \frac{3}{2}$
c. $x = -1$
d. $x = 4$
e. $x = 0$

8. (10p) Let $f: [0, +\infty) \to (0, +\infty)$ such that $f(x) + f(1-x) = 1$ for all $x \in [0, +\infty)$ and the sequences of real numbers $a_n = \sum_{k=1}^{n-1} f\left(\frac{n-k}{n}\right)$, $b_n = ln\frac{a_n}{n}, n \geq 3$. If $L = \lim_{n\to+\infty} b_n$, then L is:

a. 0
b. ∞
c. $ln\frac{1}{2}$
d. $ln2$
e. 1

9. (5p) Consider the system of equations

$$\begin{cases} mx + m^2y - z = m^2 \\ x - my + z = 2 \\ x - y + z = -1 \end{cases}, \quad \text{where } m \in \boldsymbol{R}.$$

The system is incompatible for:

a. $m = -1$
b. $m = 1$
c. $m = 0$
d. $m \neq -1$
e. $m \neq 1$

10. (10p) The definite integral $\int_0^2 \left(\frac{3x-1}{x^2-2x-3}\right) \mathrm{d}x$ is equal to:

a. $5ln3$
b. $3ln5$
c. $5ln5$
d. $-ln3$
e. $-5 + ln5$