BUCHAREST UNIVERSITY OF ECONOMIC STUDIES
Admission 2024 - Undergraduate programme
FACULTY OF ECONOMIC CYBERNETICS, STATISTICS AND INFORMATICS

Test code: ***MEnb1***

MULTIPLE-CHOICE TEST
in MATHEMATICS

**1.** At an exam, $60\%$ of the candidates are boys and $80$ candidates are girls. Let $x$ be the number of the candidates. Then: **5p**

a. $x = 120$
b. $x = 320$
c. $x = 200$
d. $x = 180$
e. none of the above.

**2.** Let $f: R \to R$ be given by $f(x) = x^2 - 2x + 2$ and $g: R \to R$ be given by $g(x) = mx^2 + x + n$. The values of the real parameters $m$ and $n$, for which the vertex of the parabola $g$ and the vertex of the parabola $f$ are symmetric with respect to the $Ox$ axis, are: **10p**

a. $m = \frac{1}{2}$, $n = \frac{3}{2}$.
b. $m = -\frac{1}{2}$, $n = -\frac{3}{2}$.
c. $m = -\frac{1}{2}$, $n = \frac{3}{2}$.
d. $m = \frac{1}{2}$, $n = -\frac{3}{2}$
e. none of the above.

**3.** Let $5$, $x+5$, $x+10$ be the first three terms of an arithmetic progression of natural numbers. Then the sum $S_{100}$ of the first $100$ terms is: **10p**

a. $S_{100} = 25350$
b. $S_{100} = 25450$
c. $S_{100} = 25250$
d. $S_{100} = 25550$
e. none of the above.

**4.** Consider

$$S = \left\{(x,q) \in N \times N \,\middle|\, \left|\sqrt{x-2} - 3\right| + q\left(\sqrt{x-2} + 3\right) = 6\right\}.$$

Then: **10p**

a. $S = \{(x,1) | x \in \{2,3,\ldots,11\}\} \cup \{(83,0)\}$
b. $S = \{(2,1), (3,1), (11,1), (83,0)\}$
c. $S = \{(2,1), (3,1), (4,1), (10,1), (11,1)\}$
d. $S = \{(2,1), (3,1), (10,1), (11,1)\}$
e. none of the above.

**5.** Let

$$A = \begin{pmatrix} -1 & 1 \\ 1 & -1 \end{pmatrix} \in M_2(R) \text{ and } B = \begin{pmatrix} a & 1 & 1 \\ 1 & a & 1 \\ b & b & b \end{pmatrix} \in M_3(R).$$ **5p**

The values of the real parameters $a, b$ for which the matrices $A$ şi $B$ have the same rank are:

a. $a = -1$ and $b \in R$
b. $a = 2$ and $b = 1$
c. $a = -1$ and $b = 1$

d. $a = 1$ and $b \in R$
e. none of the above.

**6.** Let

$$a_n = \frac{2}{\sqrt{n^2+1}\ [2 + ln(n+1)]}, n \in N.$$

Then: **10p**

a. $\{a_n\}_n$ is a monotonically increasing sequence.
b. $\lim_{n\to\infty} a_n \neq 0.$
c. $a_n > 1 \quad \forall n \in N.$
d. $\lim_{n\to\infty} a_n = \infty.$
e. $\{a_n\}_n$ is a monotonically decreasing sequence.

**7.** Let $f : R \to R$ be given by

$$f(x) = x^3 + (a-3)x^2 + (3-2a)x + a - 1,$$

and $I$ be the set of the values of the real parameter $a$ for which $f$ has a local maximum at the point $x = 1$. Then: **10p**

a. $I = (-\infty, 0).$
b. $I = (0, \infty).$
c. $I = \{0\}.$
d. $I = \emptyset.$
e. none of the above.

**8.** Let $f : [0,\infty) \to R$ be given by

$$f(x) = \frac{2}{\sqrt{x^2+1}\ [2+ln(x+1)]}.$$

Then the equation $f(x) = 1$ has: **10p**

a. two solutions in the interval $[0,\infty)$ .
b. a unique solution in the interval $[0,\infty)$ .
c. three solutions in the interval $[0,\infty)$ .
d. $\nexists x \in [0,\infty)$ such that $x$ is a solution of the equation.
e. none of the above.

**9.** Consider

$$I_n = \int_0^{\frac{1}{n}} \frac{2}{\sqrt{n^2x^2+1}[2 + ln(nx+1)]} dx, n \in N^*.$$

Then: **10p**

a. $\lim_{n\to\infty} I_n \neq 0$
b. $\{I_n\}_{n\in N^*}$ is not a convergent sequence.
c. the sequence $\{I_n\}_{n\in N^*}$ has no convergent subsequence.
d. $\lim_{n\to\infty} I_n = 0$
e. none of the above.

**10.** Consider

$$I = \int_0^1 15(x^2 - x)(x^2 + x)\,dx.$$

Then: **10p**

a. $I = -2$
b. $I = -30$
c. $I = -\frac{2}{15}$
d. $I = -\frac{1}{15}$
e. none of the above.

[redacted]

Seria a II-a. 13.04.2024
Facultatea CSIE
Matematică
Cod grilă MEub1

**Cod Grilă**

| 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| ● | ○ | ○ | ○ | ○ | ○ |

**Disciplină**

- ○ Matematică (în limba română)
- ● Matematică (în limba engleză)
- ○ Limba Română + Economie

| Nr. | A | B | C | D | E | |
|---|---|---|---|---|---|---|
| 1 | ○ | ○ | ● | ○ | ○ | 5 |
| 2 | ○ | ● | ○ | ○ | ○ | 10 |
| 3 | ○ | ○ | ● | ○ | ○ | 10 |
| 4 | ● | ○ | ○ | ○ | ○ | 10 |
| 5 | ○ | ○ | ○ | ● | ○ | 5 |
| 6 | ○ | ○ | ○ | ○ | ● | 10 |
| 7 | ● | ○ | ○ | ○ | ○ | 10 |
| 8 | ○ | ● | ○ | ○ | ○ | 10 |
| 9 | ○ | ○ | ○ | ● | ○ | 10 |
| 10 | ○ | ○ | ● | ○ | ○ | 10 |