

## Chestionar de concurs – varianta A

## MATEMATICA

1. Fie  $f: \mathbb{R} \rightarrow \mathbb{R}$ ,  $f(x) = \begin{cases} 2x + m, & x \leq 1 \\ m^2x + 2, & x > 1 \end{cases}$ . Funcția  $f$  este continuă pe  $\mathbb{R}$  dacă parametrul real  $m$  aparține mulțimii:

A	B	C	D
{0,1}	{2,3}	{1,2}	{0,2}

2. Fie  $f: \mathbb{R} \rightarrow \mathbb{R}$ ,  $f(x) = 2 + 3x$ . Punctul care aparține graficului funcției  $f$  este:

A	B	C	D
$A(0,3)$	$A(1,-5)$	$A(5,1)$	$A(1,5)$

3. Dacă  $f: \mathbb{R} \rightarrow \mathbb{R}$ ,  $f(x) = x^2 e^x$ , atunci  $f'(0)$  este:

A	B	C	D
0	1	$e^2$	$e$

4. Valoarea lui  $x \in \mathbb{R}$  pentru care numerele  $x + 1$ ,  $4x + 1$  și  $8x + 11$  sunt în progresie aritmetică este:

A	B	C	D
-10	10	14	0

5. Știind că  $i^2 = -1$ , atunci partea reală a numărului complex  $(3 + i)(1 + 2i)$ , este:

A	B	C	D
1	4	2	3

6. Fie  $A(1,3)$  și  $B(-1,5)$ . Coordonatele punctului  $C$  știind că punctul  $B$  este mijlocul segmentului  $AC$  sunt:

A	B	C	D
$(3,7)$	$(-3,-7)$	$(-3,7)$	$(3,-7)$

7. Soluția ecuației  $C_n^1 = 5$  este:

A	B	C	D
10	5	20	15

8. Fie  $G = (2, +\infty)$  și legea de compoziție  $x * y = xy - 2x - 2y + 6$ , pentru orice  $x, y \in G$ . Ecuația  $x * x = 6$  are suma soluțiilor egală cu:

A	B	C	D
4	2	0	3

9. Valoarea integralei definite  $\int_0^2 \frac{x^2 + 2x + 1}{x + 1} dx$  este:

A	B	C	D
4	6	0	2

## INFORMATICĂ

10. Rezultatul operației  $2023 \% 2024$  (C/C++) respectiv  $2023 \bmod 2024$  (Pascal) este:

A	B	C	D
2023	1	2024	0

11. Pentru definirea unui punct Q de coordonate (x,y) în plan se definește structura / înregistrarea:

<pre>type p=record   x,y : real; end; var p Q;</pre>	<pre>struct p {   float x,y; }; p Q;</pre>
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Pentru a testa dacă punctul Q este situat pe dreapta de ecuație  $2 \cdot x + y = 2023$  se poate utiliza expresia:

A	B	C	D
$2 \cdot Q.x + Q.y == 2023$ în C/C++ respectiv $2 \cdot Q.x + Q.y = 2023$ în Pascal	$2 \cdot x.Q + Q.y == 2023$ în C/C++ respectiv $2 \cdot x.Q + Q.y = 2023$ în Pascal	$2 \cdot Q.x + y.Q == 2023$ în C/C++ respectiv $2 \cdot Q.x + y.Q = 2023$ în Pascal	$2 \cdot x.Q + y.Q == 2023$ în C/C++ respectiv $2 \cdot x.Q + y.Q = 2023$ în Pascal

12. Se consideră următorul subprogram recursiv. Ce valori se vor afișa în urma executării subprogramului cu **recursiv(0)**, respectiv **recursiv(8)**?

<pre>var x:integer;  function recursiv(var x:integer) begin   if (x&lt;=0) then     recursiv:=1;   else     recursiv:=x+recursiv(x div 2); end</pre>	<pre>int x;  int recursiv(int x) {   if (x&lt;=0)     return 1;   else     return x + recursiv(x/2); }</pre>
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A	B	C	D
recursiv(0) = 0 recursiv(8) = 15	recursiv(0) = 1 recursiv(8) = 16	recursiv(0) = 0 recursiv(8) = 16	recursiv(0) = 1 recursiv(8) = 15

13. Se consideră secvența de cod alăturată. Ce se va scrie în fișier în urma rulării acestei secvențe?

<pre>var i:integer; var a: array[0..9] of integer; var fisier: text; begin   assign(fisier,'exercitiu.out');   rewrite(fisier);   for i in range(1, 7):     a[i] = i * i mod 2;   write(fisier,a[5]);   close(fisier); end.</pre>	<pre>int i, a[10]; ofstream f("exercitiu.out");  for(i=1;i&lt;=7;i++)   a[i]=i*i%2; f&lt;&lt;a[5]; f.close();</pre>
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A	B	C	D
1	5	10101	10305

14. Numărul de grafuri neorientate cu cinci vârfuri care pot fi definite este egal cu:

A	B	C	D
1224	1124	1324	1024

15. Ce valori se vor afișa în urma executării programului?

<pre>var x,y:integer;  procedure schimba(var a,b:integer) var t:integer; begin   t:=^a; ^a:=^b; ^b:=t;   write(^a, ' ', ^b, ' '); end  begin   x:=5; y:=7; write(x, ' ', y);   schimba(x,y); write(x, ' ', y); end.</pre>	<pre>int x,y;  void schimba(int *a, int *b){   int t;   t=*a; *a=*b; *b=t;   cout&lt;&lt;*a&lt;&lt;' '&lt;&lt;*b&lt;&lt;' '; }  int main(){   x=5; y=7; cout&lt;&lt;x&lt;&lt;' '&lt;&lt;y&lt;&lt;' ';   schimba(&amp;x,&amp;y); cout&lt;&lt;x&lt;&lt;' '&lt;&lt;y; }</pre>
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A	B	C	D
577557	577575	575757	575775

16. Care este valoarea lui T după algoritmul următor, dacă inițial X=5 și Y=3?

```
T = X
daca T < Y atunci
    T = Y
sfarsit
```

A	B	C	D
5	3	8	0

17. Se generează cu metoda backtracking, în ordine lexicografică toate permutările mulțimii {A,B,C}. Primele trei permutări generate sunt: {A,B,C}, {A,C,B}, {B,A,C}. Permutarea următoare va fi:

A	B	C	D
{C,B,A}	{B,C,A}	{C,A,B}	{B,A,C}

18. Ce tip de structură algoritmică este reprezentată în secvența de algoritm următoare:

```
dacă T >= 0 atunci
    ...
sfarsit
```

A	B	C	D
repetitivă	liniară	alternativă	vidă

### LIMBA ENGLEZĂ Reading Comprehension

Sister Wendy Beckett has been a nun for nearly 50 years, since she was 16. Most of the time she lives in solitary confinement in a caravan on the grounds of a Carmelite monastery in Norfolk, often not speaking to anyone for 22 hours a day. But every few months she leaves her caravan and travels round Europe, staying in international hotels and eating in famous restaurants. Why is she leading this double life? Sister Wendy has a remarkable other life. She writes and presents an arts programme for BBC television called “Sister Wendy’s Grand Tour”. In it, she visits European art capitals and gives her personal opinions on some of the world’s most famous works of art.

19. Sister Wendy leaves her caravan every few months because:

A	B	C	D
she wants to travel and take a break from being a nun.	she travels to meet with other nuns from all over Europe.	she writes and presents an arts programme for the BBC.	she is a famous artist and goes on tour across Europe.

20. What is Sister Wendy’s main occupation?

A	B	C	D
She is a writer.	She is a nun.	She is a nurse.	She is an artist.

Wasfia Nazreen was born in Bangladesh. She went to the U.S. at age 17 on a full college scholarship and then to India, where she worked with Tibetan refugees and discovered a passion for mountain climbing. In 2011, two years after returning to Bangladesh, she announced a plan to reach the highest peak on each of the seven continents. Her goal was a celebration of progress for women. In November 2015 she planted the Bangladeshi flag on Oceania’s Puncak Jaya and became one of some 50 women to accomplish the seven-summit feat. She is now planning on building a foundation giving support to young women in her country and across South Asia through education and outdoor training.

21. What are Nazreen’s plans for the future?

A	B	C	D
to reach the highest peak on each of the seven continents	to build a foundation for young women	to work with Tibetan refugees	to move to South Asia

22. Where did Nazreen discover a passion for mountain climbing?

A	B	C	D
in India	in Tibet	in Bangladesh	in the U.S.

The Georgina family lives in a two-room shack in Colina, Chile. The shack has electricity but no toilet or running water. The children wash in a small bowl in the dusty backyard. At times there is very little food in the Georginas’ small house. When there’s not enough food for everyone, Mrs. Georgina makes sure the youngest children do not go hungry. Obviously, the Georginas do not have enough money for their big family. Why, then, do they continue to have children?

23. Who is never hungry in the Georgina family?

A	B	C	D
all the children	Mr. Georgina	the youngest children	Mrs. Georgina

24. According to this text, the Georgina family is

A	B	C	D
rich	middle class	poor	small

### Vocabulary & Grammar

25. John greeted me \_\_\_\_\_.

A	B	C	D
friend	friendship	in a friendly way	friendless

26. My favourite free time activity is horse- \_\_\_\_\_.

A	B	C	D
riding	reading	walking	driving

27. He broke the world \_\_\_\_\_ for the 100 metres.

A	B	C	D
record	mark	standard	level

28. I have no money in my purse; I have forgotten \_\_\_\_\_ at home.

A	B	C	D
its	it	they	them

29. Open-top \_\_\_\_\_ tours for hop-on hop-off travelling are available in all European capitals.

A	B	C	D
sightseer	foreseeing	foreseer	sightseeing

30. We will \_\_\_\_\_ tell anyone our secret.

A	B	C	D
anytime	never	hard	ever

31. I've often \_\_\_\_\_ at this hotel.

A	B	C	D
remained	enjoyed	stayed	passed

32. Can you please go to \_\_\_\_\_ grocery store on Fifth Street and buy 2 cartons of milk?

A	B	C	D
-	the	an	no

33. I don't know, and that's \_\_\_\_\_ truth.

A	B	C	D
a	an	the	one

34. He \_\_\_\_\_ me by two games to one.

A	B	C	D
won	conquered	beat	gained

35. Breakfast is one of those \_\_\_\_\_ that varies from person to person.

A	B	C	D
times	foods	plates	meals

36. A \_\_\_\_\_ is an excursion at which a meal is eaten outdoors taking place in a scenic landscape.

A	B	C	D
sightseeing	supper	picnic	view

