1. Să se calculeze $\dfrac{1}{x_1} + \dfrac{1}{x_2}$, unde x_1, x_2 sunt soluțiile ecuației $x^2 - 5x + 3 = 0$.

   a) $\dfrac{5}{3}$; **b)** 1; **c)** 2; **d)** 5.

2. Dacă $\sin x = \dfrac{3}{5}$ și $x \in \left(0, \dfrac{\pi}{2}\right)$, atunci $\sin 2x$ este egal cu:

   a) $\dfrac{6}{25}$; **b)** 0; **c)** -1; **d)** $\dfrac{24}{25}$.

3. Fie punctele în planul de coordonate xOy : $A(3,0)$, $B(0,4)$ și $C(1,2)$. Să se scrie ecuația medianei din B a triunghiului ABC:

   a) $2x + y - 5 = 0$; **b)** $2x + y - 4 = 0$; **c)** $x + 2y - 10 = 0$; **d)** $3x + 2y - 8 = 0$.

4. Într-o progresie aritmetică $\left(a_n\right)_{n\geq 1}$, avem $a_{10} = 100$ și $a_{100} = 10$. Să se calculeze a_{1000}.

   a) -890; **b)** -1000; **c)** 0; **d)** -900.

5. Să se calculeze numărul complex $z = \dfrac{(1+i)^{2024}}{(1-i)^{2024}}$, unde $i^2 = -1$.

   a) $z = i$; **b)** $z = 2i$; **c)** $z = 1$; **d)** $z = -1$.

6. Fie matricea $A = \begin{pmatrix} 1 & 3 \\ 2 & -1 \end{pmatrix}$. Să se calculeze determinantul matricei $B = A^{2024} - I_2$, unde $I_2 = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$.

   a) 0; **b)** 1; **c)** $7^{2024} - 1$; **d)** $\left(7^{1012} - 1\right)^2$.

7. Știind că $\displaystyle\int_{\log_2 5}^{\log_2 20} x\,dx = \log_2 M$, atunci valoarea lui M este:

   a) 2; **b)** 5; **c)** 100; **d)** 10.

8. Să se calculeze $\displaystyle\lim_{x \to +\infty} \left(\sqrt{x^2 + x} + \sqrt{x^2 + 2x} + \ldots + \sqrt{x^2 + 8x} - 8x\right)$.

   a) 8; **b)** 18; **c)** 24; **d)** 10.

9. Fie funcția $f : \mathbf{R}^* \to \mathbf{R}$, $f(x) = x \cdot e^{\frac{1}{x}}$. Pentru câte valori întregi ale lui m, ecuația $f(x) = m$ nu are soluții reale?

   a) 5; **b)** 3; **c)** 1; **d)** 7.

1. Știind că variabilele **x**, **y**, **z** memorează numere naturale, nenule și distincte două câte două, indicați care dintre următoarele expresii **C++** au valoarea **1** dacă și numai dacă numărul memorat în variabila **z** este fie multiplu de **x** și de **y**, fie este divizor al lui **x** și al lui **y**.

a. `!(z%x || z%y) && x%z==0 && z%y==0`

b. `(z%x + z%y==0) || !(x%z || y%z)`

c. `(x%z==0 || y%z==0) && y%x==0 && z%y==0`

d. `z%(x*y)==0 && (x*y)%z==0`

2. Se consideră secvența de program **C++** cu variabilele întregi **i,j,x** și **s**.

```
s=0; i=1;
do
{
    if(i+s<=x)
    {
        s+=i;
        for(j=1;j<=i;j++)
        cout<<j<<" ";
        i++;
    }
    else s=x;
}while(s<x);
```

Indicați ce valoare are numărul **x** astfel încât la executarea acestei secvențe de program șirul numerelor afișate să conțină numărul **1** de patru ori.

a. 27   **b. 16**   **c. 11**   **d. 4**

3. Pentru tablourile unidimensionale **x** care are **3** elemente și **y** care are **4** elemente, se aplică operațiile următoare:

- interclasarea tablourilor **x** și **y** prin care se obține tabloul **z**,
- căutarea binară a valorii **c** în tabloul **z**.

Știind că valoarea **c** a fost găsită în tabloul **z** la a treia comparație, indicați varianta utilizată.

a. `x=(5,9,24),y=(2,14,7,10),c=7`   **b.** `x=(5,7,14),y=(2,9,10,24),c=5`

c. `x=(2,7,14),y=(5,10,9,24),c=10`   **d.** `x=(2,7,14),y=(5,9,10,24),c=24`

4. Se consideră următoarea secvență de program.

```
int i,j,n=8,a[11][11];
for(i=1;i<=n;i++)
   for(j=1;j<=n;j++)
      if(i%3+j/3==4)
         a[i][j]=6;
      else
         a[i][j]=i/3+j%3;
```

Indicați coloanele care **nu** conțin elemente egale cu trei la executarea acestei secvențe de program.

a. 1,3,5   **b. 3,6**   **c. 1,2,7**   **d. 3,6,8**

5. Indicați ce se va afișa pe ecran în urma executării următoarei secvențe de program.

```
char s[25]="general";
int i=0,n=strlen(s);
while(i<n)
    if(strchr("aeiou",s[i])!=0)
    {
        for(int k=1;k<3;k++)
        {
            n++;
            for(int j=n;j>i;j--)
            s[j]=s[j-1];
        }
        s[i+1]='i';
        s[i+2]=s[i-1];
        i=i+3;
    }
    else i++;
cout<<s;
```
a. geiniali   **b. geigneimrairl**
c. geieneieraial   **d. geigneinrairl**

6. Cu ajutorul metodei backtracking se generează în ordine lexicografică, toate parolele formate din **5** caractere distincte din mulțimea **{a,b,c,e,f,g,u}** și care conțin cel puțin **2** vocale și cel puțin **2** consoane. Primele soluții generate sunt: **abcef**, **abceg**, **abceu**, **abecf**. Indicați care dintre soluțiile următoare **nu** reprezintă secvența de șiruri generate consecutiv.

a. gufab, gufeb, gufec   **b. fegua, fegub, feguc**
c. bacue, bacuf, bacug   **d. efabu, efacb, efacg**

7. Se consideră subprogramul **f** definit mai jos. Indicați ce se va afișa la apelul **f(4,1)**.

```
void f(int x, int y)
{
    int j;
    if(y<x)
    {
        f(x,y+1);
        for(j=1;j<=y;j++)
        cout<<j+2;
    }
}
```
a. 334345   **b. 112123**   **c. 345343**   **d. 123121**

8. Într-un arbore cu **9** noduri, toate frunzele sunt pe ultimul nivel și fiecare nod care nu este frunză, are cel mult trei fii. Indicați care dintre următoarele variante poate fi vectorul de tați al unui astfel de arbore cu înălțimea minimă.

```
t1=(2,3,0,3,4,2,2,3,4)        t2=(0,1,2,1,2,1,4,6,4)
t3=(8,8,8,1,2,2,3,9,0)        t4=(6,7,6,7,0,5,5,6,7)
```
a. t2,t4   **b. t1,t2,t4**   **c. t2,t3**   **d. t2,t3,t4**

9. Fie un graf orientat **G** cu **6** noduri, reprezentat prin următoarele liste de adiacență: **1:(2,3)**, **2:(6)**, **3:(2)**, **4:(5)**, **5:(4)**, **6:(4)**. Indicați care dintre următoarele afirmații **nu** este adevărată.

a. Graful **G** nu este tare conex.
b. Graful **G** are **5** componente tare conexe.
c. Graful **G** are **4** componente tare conexe.
d. Graful **G** devine tare conex dacă se adaugă cel puțin două arce noi.

DISCIPLINA LIMBA ENGLEZĂ

Read the texts below and choose the best answer a, b, c, or d. Only ONE variant is possible.

Digital advertising billboards next to a busy road junction in Preston have been turned down by the city council because they are too big. The illuminated back-to-back screens, near the intersection of Strand Road and Marsh Lane, which can show up to 48 different ads in rotation, would measure six meters long by three meters wide and would stand 2.6m off the ground, according to a planning application submitted to the authority. But the council has recommended they should be refused because "by virtue of their sitting, height, size, scale and design, would be incompatible and visually intrusive features that detract from the character of the area."

London-based outdoor advertising company Clear Channel UK wanted to put the screens on the car park of the former Neptune pub which is now flats. But the council said the proposed luminance level of the screens would be <u>four times as bright as</u> was desirable in that location, especially with the close proximity of the flats. <u>They</u> ruled they would be "unduly prominent", the visual impact would be "significant" and the site was "unsuitable for the scale of the advertisements proposed."

1. **The first paragraph informs us that …**

a	digital ads were not accepted due to their size.
b	road junctions are busy with displaying ads.
c	junctions are illuminated by huge digital screens.
d	the council recommend digital ads in the city.

2. **The screens would have been installed …**

a	at an elevation of 2.6m on top of the houses.
b	at a distance of 2.6m from one another.
c	at a height of 2.6m above the ground.
d	at an altitude of 2.6m below the junction.

3. **The characteristics of the digital ads …**

a	are visualized only by drivers.
b	are smarter than those of the area.
c	do not match with those of the area.
d	are not visible because of their size.

4. The second paragraph tells us that …

a	the former pub was transformed into a house.
b	the parking of a pub was replaced by housing.
c	the Neptune pub used to have digital advertising.
d	the screens had been removed from the car park.

5. The phrase "*four times as bright as*" is equivalent to …

a	"much more brighter than …".
b	"of the same brightness as…".
c	"four times darker than …".
d	"much brighter than…".

6. The underlined word "*They*" of the last sentence is used in reference to …

a	council members.
b	advertisements.
c	screens.
d	ad makers.

In her book *Loved Clothes Last*, Orsola de Castro, founder of the global campaign Fashion Revolution, issues an appeal. "In my years of inspecting second-hand clothing sorting warehouses, I have seen hundreds of perfect pieces abandoned simply because of a broken zip. But can we please stop and consider what we are doing when we give up hope on the one that broke? And what happens when we choose to mend it instead?"

De Castro's questions are just two of many confronting fashion in the 21st century. It is increasingly hard to minimize the environmental and social damage the industry causes. Natural resource use rates are stratospheric, as are pollution and waste levels, while global supply chains are sites of exploitation. Finally, the sector is responsible for between two and eight percent of total global greenhouse gas emissions, depending on which study you read. These are breathtaking facts, given that, after a certain point, this is an industry trading in non-essentials. Very few of us in fashion-consuming capitals around the world really need more clothes. Yet, nonetheless, between 80 to 100 billion pieces are manufactured per year.

7. The appeal issued by the author of the book would be …

a	"Let us hope that second-hand clothes are not broken!"
b	"Let us buy only second-hand products!"
c	"Let us buy zippers instead of buying second-hand stuff!"
d	"Let us fix minor flaws in products and not buy new stuff!"

8. The underlined word "_instead_" should be understood as …

a	"instead of damaging new stuff".
b	"instead of breaking the zip".
c	"instead of repairing the zip".
d	"instead of buying new stuff".

9. The phrase "_are stratospheric_", in paragraph two, has the meaning …

a	"exaggeratedly low".
b	"very high".
c	"extremely natural".
d	"very resourceful".

10. The fashion sector holds responsibility for …

a	animal exploitation.
b	unemployment.
c	air pollution.
d	capital cities evolution.

11. The products sold by the fashion industry are …

a	not second-hand at all times.
b	not expensive for ordinary people.
c	not sufficient for city residents.
d	not vital for human survival.

12. "_Nonetheless_" used in the last sentence of the text has the meaning …

a	"Although people do not really need more clothes".
b	"None of the people needs clothes".
c	"The need for clothes is less than expected".
d	"No one needs less clothing than on a regular basis".

When the French voted no to the European constitution, they were rejecting the specter of a borderless world in which foreign goods, Polish plumbers and even British politicians would be handed a growing role in French society. This sentiment was expressed most clearly by incoming Prime Minister Dominique de Villepin in June, 2005, when he declared: "The French know it and say it forcefully: globalization is not an ideal, it cannot be our destiny."

Yet within days, a new invader arrived in France by popular demand. It was the Logan, a roomy family sedan that Renault conceived as a "world car" to be built in the developing world, for sale in the developing world, at a price as low as €5,000. A founding member of the French industrial elite that has fallen on hard times, Renault saw the Logan as critical to its future, projecting sales of 1 million a year, or 25 percent of Renault's total, by 2010. But the man who championed the Logan, Renault ex-president Louis Schweitzer, never _envisioned_ a market for the car in Western Europe, where it's since become an unexpected cult hit, particularly in France. Just as the French bash America but flock to McDonald's, they reject globalization but embrace the world car.

13. We learn from the first paragraph that …

a	French people were against the monopoly of foreigners on their community.
b	French citizens were opposing Polish workers in their country.
c	France voted against the European constitution because they dislike the British.
d	France rejected the European law because their Prime Minister was against it.

14. The second paragraph informs us that the accepted "invasion" of the Logan in France took place …

a	due to its reduction in price by 25%.
b	because its immediate popularity among the French.
c	since the car had been advertised by Renault ex-president.
d	because French people like to embrace cars.

15. Based on the text, Renault has been …

a	a company that supported developing countries.
b	one of the best representative companies of French economy.
c	a company that never sold cars on the Western European market.
d	one of the French companies opposing McDonald's.

16. Renault hoped that sales of Logan would reach …

a	hard times in Western Europe.
b	five thousand cars by 2010.
c	one million cars in 2010.
d	a quarter of its overall trade.

17. The word "*envisioned*" from the text can be best replaced by …

a	predicted.
b	promised.
c	preferred.
d	praised.

18. The closest meaning of the sentence *"Just as the French bash America but flock to McDonald's"* is …

a	The French criticize the Americans but adore their food.
b	The French admire America but reject the food they eat.
c	The French travel to America and go to McDonald's.
d	The French dislike American McDonald's restaurants.

BAREM DE EVALUARE ŞI APRECIERE A
TESTULUI DE VERIFICARE A CUNOȘTINȚELOR

A

Matematică

ITEM	VARIANTA DE RĂSPUNS
1.	a
2.	d
3.	d
4.	a
5.	c
6.	d
7.	c
8.	b
9.	b

Informatică

ITEM	VARIANTA DE RĂSPUNS
1.	b
2.	c
3.	d
4.	b
5.	d
6.	a
7.	c
8.	a
9.	c

Limba engleză

ITEM	VARIANTA DE RĂSPUNS
1.	a
2.	c
3.	c
4.	b
5.	d
6.	a
7.	d
8.	d
9.	b
10.	c
11.	d
12.	a
13.	a
14.	b
15.	b
16.	d
17.	a
18.	a