LUCRARE SCRISĂ LA LIMBA STRĂINĂ – ENGLEZĂ
VARIANTA II

A. Partea I: CITIT
(Citirea cu atenție)

Choose the correct answer a, b, c, or d.

In Britain today, both the public and politicians agree that families matter. Four out of five people say that 'my family is more important to me than my friends', and families currently ride high on the policy agendas of both the Labour and the Conservative Parties. One thing that unites everyone in Britain is the need for parents to take more responsibility for their children: 64% of us strongly agree with these matters.

Yet 'the family', both in public opinion and as a policy area, is a source of persistent contradictions and trade-offs. Privately, families must balance the competing interests of parents, children and other dependants within the household such as elderly relatives.

The traditional single male breadwinner family is declining and the growth of single-parent families and other new kinds of family present many new challenges for government policy on welfare, work-life balance and in many other areas.

Families in Britain aim to be a starting point for a debate on policy, charting the changing nature of the family, and what that means for parents, children and our wider society.

1. The text informs us that…

a	Both the Labour and the Conservative Parties have policy agendas.
b	Until now, friends are more important than family in Britain.
c	The public and the politicians equally matter.
d	Most people agree that family is more important than friends.

2. There are many disputes within government policies regarding…

a	The growth of single-parent and other new kinds of families.
b	Traditional balanced families.
c	Single male breadwinner and single-parent families.
d	Welfare, work-life balance and other domains.

Surfing is a surface water sport in which the participant, referred to as a "surfer", rides a surfboard on the crest and face of a wave, which is carrying the surfer towards the shore. Waves suitable for surfing are found primarily in the ocean, but are also sometimes found in lakes and rivers, and also in man-made wave pools.

Many variations of the sport may exist in certain areas and the definitions of what constitutes a suitable wave, and craft has expanded over the years. Bodysurfing involves riding the wave without a board, and is considered by some to be the purest form of surfing. Other variations that have existed for centuries include paipo boarding, stand up paddle surfing, and the use of boats or canoes to ride waves. More modern craft that are used include bodyboards and inflatable mats (surfmatting). Other objects have occasionally been used instead of surfboards, including water skis, wakeboards, desks, guitars and doors.

3. The passage informs us that…

a	Surfing is a sport where there's a need of suitable waves.
b	Surfing is an activity in which a person uses a surfboard to get to the shore.
c	Waves suitable for surfing are usually found in lakes, rivers and pools.
d	The surfer rides a surfboard on top of a wave.

4. Body surfing involves…

a	Using paipo boarding.
b	The most authentic form of surfing.
c	Practice without a board.
d	The use of canoes and boats.

5. Surfboards are sporadically replaced by…

a	Inflatable mats.
b	Paddle surfing.
c	Water skis, wakeboards, desks, guitars and doors.
d	Man-made wave pools and bodyboards.

(*Citirea selectivă*)

Pizza is a type of bread and tomato dish, often served with cheese. However, until the late 19th or early 20th century, the dish was sweet, not savory. The term `pizza` first appeared in a Latin text from the southern Italian town of Gaeta in 997 A.D., which claims that a landlord of certain property is to give the bishop of Gaeta "twelve pizzas", every Christmas Day.

In 16th century, pizza was the dish of the poor, being sold in the street. Before the 17th century, pizza was covered with red sauce. This was later replaced by oil, tomatoes or fish. In 1843, Alexandre Dumas described the diversity of pizza toppings. In June 1889, to honour the Queen consort of Italy, Margherita of Savoy, the Neapolitan chef Raffaele Esposito created the "Pizza Margherita" a pizza garnished with tomatoes, mozzarella cheese, and basil, to represent the colors of the Italian flag. He was the first to add cheese. The sequence through which flavored flatbreads of the ancient and medieval Mediterranean became the dish popularized in the 20th century is not fully understood.

6. Before the 20th century pizza…

a	used to be sugary.
b	contained bread and tomatoes.
c	had cheese.
d	was spicy.

7. “Pizza Margherita” was…

a	cooked until 1889.
b	the symbol of the Italian colors.
c	honourable for Alexandre Dumas.
d	garnished by Margherita of Savoy.

8. Pizza became famous in the 20th century ….

a	because cheese savor was introduced.
b	as a result of the diversity of toppings.
c	owing to Raffaele Esposito.
d	due to unknown reasons.

Harrods` founder, Henry Edward Harrod, first established his business in 1824, aged 25. The premises were located at 228, Borough High Street. During 1825 the business was listed as 'Harrod and Wicking, Linen Drapers, Retail', but this partnership was dissolved at the end of that year. In 1834 in London's East End, he established a wholesale grocery with a special interest in tea. In 1849, to escape the vice of the inner city and to capitalize on trade to the Great Exhibition of 1851, Harrod took over a small shop in the district of Brompton, on the site of the current store. Harrods rapidly expanded, acquired the adjoining buildings, and employed one hundred people by 1880.

In early December 1883, the store burnt to the ground. On 16th November 1898, Harrods debuted England's first "moving staircase" (escalator) in their Brompton Road stores. Throughout its history, the store has had a total of five owners. On 8 May 2010, Mohamed Al-Fayed sold the store to Qatar Holdings for £1.5 billion.

9. Harrods` was initially founded…

a	not long before the Great Exhibition.
b	by the 25-year old Henry Edward Harrod.
c	As a small partnership.
d	with the name 'Harrod and Wicking, Linen Drapers, Retail'.

10. By the end of 1825, the company…

a	ceased its profile activity.
b	changed its name.
c	was situated on Borough High Street.
d	registered as a trademark.

11. Selling tea held a unique place…

a	for the adjoining buildings.
b	in Brompton Road stores.
c	between 1834-1849.
d	in 1834.

12. Brompton area…

a	had the first stairways.
b	was home for Harrods` shops.
c	housed a small shop in 1849.
d	held additional buildings in 1851.

The British Military Cross was instituted on 28 December 1914 as a means of formally recognizing the courage of junior officers during wartime (officially for "gallantry in the field" for Captains and below). In this way the Military Cross replaced the Military Medal which was awarded to servicemen below officer rank.

Until the institution of the Distinguished Flying Cross (DFC) in June 1918 many officers of comparable rank within the air service were similarly awarded the Military Cross in recognition of their daring aerial missions.

From 1931 the MC (as it was known) was also awarded to Majors. Although recipients were not initially permitted to list the letters MC after their name this restriction was subsequently withdrawn. Awards of the MC were announced in the *London Gazette* along with a citation, other than for those awarded as part of New Year or Birthday honors. Some 37,081 MCs were awarded during the First World War.

13. The British Military Cross symbolized…

a	a military reward.
b	the courage of young officers.
c	bravery in case of captains.
d	a prize given to servicemen below officer rank.

14. A lot of officers were granted the Military Cross…

a	if they belonged to the air service.
b	in June 1918.
c	when Distinguished Flying Cross was introduced.
d	for appreciation of their air missions.

15. Prizes were made public…

a	during the First World War.
b	in the *London Gazette*.
c	in case of majors.
d	as part of New Year or Birthday honors.

Partea a II-a: ELEMENTE DE GRAMATICĂ ŞI VOCABULAR

(*Gramatică*)

Choose the correct answer a, b, c, or d.

16. One……..of this job is that it is near where I live.

a	preference
b	goodness
c	advantage
d	pleasure

17. ……thinks that Phil should be given the job.

a	The majority of my colleagues
b	All of us
c	A number of people
d	Practically everyone

18. I'll be with you in……

a	the quarter of one hour
b	quarter of the hour
c	a quarter of an hour
d	a quarter of hour

19. Look at…. . It's very bright tonight.

a	the moons
b	the moon
c	moon
d	a moon

20. Sydney is…….

a	a beautiful city
b	beautiful city
c	the beautiful city
d	the beautiful cities

21. …is one of the many factors involved in changing farming methods.

a	A climate
b	Climates
c	Climate
d	Any climate

22. … to Athens during the vacation.

a	They all are going
b	All they are going
c	All are they going
d	They are all going

23. There is….evidence to support his claim.

a	little
b	a little
c	few
d	a few

24. She swam strongly and…cross the river easily, even though it was swollen by the heavy rain.

a	is able to
b	was able to
c	might
d	can

25. Don't……him to arrive early. He's always late.

a	judge
b	expect
c	attend
d	think

(Vocabular)

26. The school arranges a ….to Brighton every week.

a	passage
b	travel
c	trip
d	journey

27. We would….to stay at home this evening.

a	rather
b	approve
c	counsel
d	prefer

28. I'm sorry we're late, it's all my…!

a	fault
b	compassion
c	crime
d	wrong

29. There will now be a…..interval for refreshments.

a	short
b	little
c	bright
d	light

30. Just as we were sitting down for the picnic it….began to rain.

a	later
b	suddenly
c	at once
d	in a moment

31. Browns Ltd. will have to…sales during the coming year.

a	enlarge
b	expand
c	increase
d	extend

32. Please come around this evening, I….to see you urgently.

a	could
b	long
c	beg
d	need

33. It's over a year…I visited the dentist.

a	when
b	yet
c	past
d	since

34. Why don't you do something worthwhile with your time instead of just…it!

a	cheating
b	wasting
c	loosing
d	breaking

35. …study harder, I'll have to fail you.

a	If you don't
b	If you wouldn't
c	Unless you don't
d	If you won't

B. Partea a III-a: SCRIS

36. Choose the most appropriate line to formulate an informal request.

a	Would you be so kind to tell me how to get to the station?
b	I wonder if you could tell me how to get to the station.
c	Do you know how I can get to the station?
d	Could you tell me where the station is, please?

37. Which is the most appropriate sentence to make a complaint?

a	I'm so sad that the washing machine is not working properly!
b	This washing machine is driving me crazy!
c	Excuse me, there appears to be something wrong with the washing machine!
d	I'm sorry but this washing machine is out of order!

38. Choose the most appropriate line to begin a formal letter.

a	Dear Madam Johnson,
b	Dear Mrs. Johnson,
c	Dear lady,
d	Lady,

39. Which is the correct word order?

a	The place where she lives is not far from here!
b	The place she lives where is not far from here!
c	The place where is not far from here she lives!
d	The place is not far from here where she lives!

40. Choose the most appropriate line to make a formal invitation:

a	Let's have a cup of coffee!
b	Do care to join me for a coffee?
c	Do you feel like drinking a cup of coffee?
d	Would you care to join me for a cup of coffee?

41. Which is the most logical statement?

a	Unless the directors didn't increase sales, we'd have to close this shop.
b	Unless the directors increased sales, we'd have to close this shop.
c	Unless the directors hadn't increased sales, we'd have to close this shop.
d	Unless the directors increased sales, we wouldn't have to close this shop.

42. Which is the correct address?

a	30, Commercial Rd., 29 200, Portsmouth, U.K.
b	29 200, 30, Commercial Rd., Portsmouth, U.K.
c	30, Commercial Rd., Portsmouth, U.K., 29 200
d	29 200, Portsmouth, 30 Commercial Rd., U.K.

43. Choose the most appropriate line to finish a formal letter:

a	I wish you health!
b	With respect,
c	Yours gladly,
d	Truly yours,

44. Which is the most logical sentence?

a	He is ought to go to the funeral today.
b	He ought go to the funeral today.
c	He ought to go to the funeral today.
d	He isn't ought to go to the funeral today.

45. Which is the best way to end an application letter?

a	I am available for an interview at any time**.**
b	I have time whenever you can.
c	I am waiting you to call me.
d	I am available only if you call me in advance.

BAREM DE EVALUARE ŞI APRECIERE A TESTULUI GRILĂ LA ENGLEZĂ
VARIANTA II

1	d	16	c	31	c
2	a	17	d	32	d
3	b	18	c	33	d
4	c	19	b	34	b
5	c	20	a	35	a
6	a	21	c	36	c
7	b	22	d	37	c
8	d	23	a	38	b
9	b	24	b	39	a
10	a	25	b	40	d
11	d	26	c	41	b
12	c	27	d	42	a
13	a	28	a	43	d
14	d	29	a	44	c
15	b	30	b	45	a

LUCRARE SCRISĂ LA PSIHOLOGIE
VARIANTA II

Notă. Cele 30 de întrebări tip grilă pot avea unul, mai multe sau toate răspunsurile corecte.

1. Când suntem concentraţi înainte de începerea unui examen important vorbim de atenţie:
   a. postvoluntară;
   b. expectativă;
   c. stabilă.

2. Raţionamentul care porneşte de la general şi ajunge la cazuri particulare prin inferenţe şi implicaţii se numeşte:
   a. raţionament inductiv;
   b. raţionament deductiv;
   c. raţionament transductiv.

3. Prin noţiunea generală, integratoare de grup uman, desemnăm:
   a. ansambluri de indivizi constituite istoric, între care există diverse tipuri de interacţiune;
   b. unul sau doi indivizi ce interacţionează cu mediul.

4. Factorii psihologici nonintelectuali ai creativităţii sunt:
   a. factorii aptitudinali;
   b. factorii motivaţionali şi atitudinali;
   c. factorii de fluenţă;
   d. factorii temperamentali.

5. Care dintre următoarele trebuinţe sunt considerate de Maslow trebuinţe de deficienţă?
   a. trebuinţe fiziologice;
   b. trebuinţe de securitate;
   c. trebuinţe cognitive;
   d. trebuinţe de iubire şi de apartenenţă la grup;
   e. trebuinţe de stimă de sine.

6. Personalitatea, evaluată din punct de vedere etic, este reprezentată de:
   a. temperament;
   b. aptitudini;
   c. inteligenţă;
   d. caracter.

7. Spiritul de observaţie reprezintă:
   a. o metodă de investigare;
   b. o atitudine;
   c. o aptitudine.

8. Memorarea logică este superioară memorării mecanice prin:
   a. autenticitate;
   b. economicitate;
   c. similaritate;
   d. productivitate.

9. Structura psihologică a atitudinii cuprinde:
   a. elemente cognitive;
   b. elemente afectiv – motivaţionale;
   c. elemente volitive.

10. Comportamentul de ajutorare se întemeiază pe:
   a. norma reciprocităţii;
   b. norma utilităţii;
   c. norma atracţiei.

11. Funcţia persuasivă a limbajului constă în:
   a. inducerea la o altă persoană a unor idei;
   b. substituirea unor obiecte, fenomene, relaţii prin formule verbale sau alte semne;
   c. exprimarea unor formule de politeţe.

12. Nivelul maxim de creativitate este atins în:
    a. creativitatea productivă;
    b. creativitatea inovativă;
    c. creativitatea inventivă;
    d. creativitatea emergentă.

13. Cea mai ridicată sensibilitate tactilă se află:
    a. pe frunte;
    b. pe spate;
    c. pe buze.

14. Visul diurn face parte din formele:
    a. imaginației voluntare;
    b. imaginației involuntare;
    c. imaginației active;
    d. imaginației pasive.

15. „Vârsta responsabilităților sociale” este considerată ca fiind:
    a. adolescența;
    b. tinerețea;
    c. maturitatea.

16. Care din legile generale ale percepției este caracteristică numai acesteia?
    a. legea integralității – structuralității;
    b. legea selectivității;
    c. legea constantei perceptive;
    d. legea proiectivității (obiectivității);
    e. legea semnificației.

17. Capacitatea este aceeaşi cu aptitudinea?
    a. da;
    b. nu.

18. Identificați temperamentul ce corespunde următoarei descrieri: este sociabil, vorbăreț, hazliu şi vivace, are spirit de grup şi aptitudini de conducere:
    a. coleric;
    b. sangvinic;
    c. flegmatic;
    d. melancolic.

19. În dezvoltarea morală, tranziția de la moralitatea constrângerii la moralitatea cooperării se realizează în:
    a. preadolescență;
    b. adolescență;
    c. postadolescență.

20. Calitatea reprezentării este condiționată de:
    a. calitatea percepției;
    b. calitatea obiectului;
    c. luminozitate.

21. În dorința copiilor de a învăța pentru a-şi satisface părinții identificăm:
    a. motivația cognitivă;
    b. motivația afectivă;
    c. motivația negativă.

22. Statusul social se defineşte prin:
    a. drepturile persoanei;
    b. îndatoririle persoanei.

23. Calitatea negativă a atenției opusă concentrării este:
    a. instabilitatea;
    b. distributivitatea;
    c. distragerea.

24. Animismul, specific vârstelor mici, constă în:
    a. curiozitate;
    b. nediferențierea eu – lume;
    c. însufleţirea obiectelor.

25. Care dintre următoarele forme de expresivitate a proceselor afective reprezintă pantomimica:
    a. schimbarea vocii;
    b. grimasele feței;
    c. ținuta;
    d. mersul.

26. Senzațiile care semnalizează postura membrelor, trunchiului şi capului sunt:
    a. senzațiile organice;
    b. senzațiile proprioceptive;
    c. senzațiile chinestezice.

27. Relațiile stabilite prin intermediul internetului sunt relații interpersonale?
    a. da;
    b. nu.

28. Suportul comunicării ca instrument de codificare şi transmitere a informației este reprezentat de:
    a. limbaj;
    b. limbă.

29. Unicitatea personalității umane este:
    a. înnăscută;
    b. dobândită.

30. P. Guilford a evidențiat trăsăturile principale ale procesului global al gândirii. Acestea sunt:
    a. flexibilitate;
    b. expresivitate;
    c. fluiditate;
    d. originalitate;
    e. elaborare.

BAREM DE EVALUARE ŞI APRECIERE A TESTULUI GRILĂ LA PSIHOLOGIE
VARIANTA II

1	b	16	d
2	b	17	b
3	a	18	b
4	a,b,d	19	a
5	a,b,d,e	20	a
6	d	21	b
7	c	22	a,b
8	a,b,d	23	c
9	a,b,c	24	c
10	a	25	c,d
11	a	26	b
12	d	27	b
13	c	28	b
14	b,d	29	a,b
15	b	30	a,c,d,e

LUCRARE SCRISĂ LA MATEMATICĂ
VARIANTA II

1. Fie ecuația $x^2 - x + m + 1 = 0$. Valoarea parametrului $m \in \mathbf{R}$ pentru care are loc relația $\frac{1}{x_1} + \frac{1}{x_2} = 1$ este:
a) $m = 0$; **b)** $m = 1$; **c)** $m = -1$; **d)** $m = 2$; **e)** $m = -2$.

2. Fie familia de funcții de gradul doi $f_m : \mathbf{R} \to \mathbf{R}$, $f_m(x) = mx^2 + 2(m-1)x + m - 1$, $m \neq 0$. Vârfurile parabolelor P_m asociate funcțiilor f_m se găsesc pe dreapta:
a) $x + y = 0$; **b)** $x - y = 0$; **c)** $x + y = 1$; **d)** $2x + y = 0$; **e)** $x + y = 2$.

3. Fie $A(1;2), B(2;5), C(3;m)$. Valoarea parametrului $m \in \mathbf{R}$ astfel încât $\overrightarrow{AB} \cdot \overrightarrow{AC} = 5$, este:
a) $m = 3$; **b)** $m = -6$; **c)** $m = 10$; **d)** $m \in \Phi$; **e)** $m = 0$.

4. Valoarea parametrului real α pentru care dreptele $(d_1) : \alpha x + (\alpha - 1)y - 3 = 0$ şi $(d_2) : 2x - (\alpha + 1)y + 1 = 0$ sunt paralele, este:
a) $\alpha \in \left\{\frac{-3-\sqrt{17}}{2}; \frac{-3+\sqrt{17}}{2}\right\}$; **b)** $\alpha \in \left\{-\frac{3}{2}; \frac{3}{2}\right\}$; **c)** $\alpha \in \{-1;2\}$; **d)** $\alpha \in \Phi$; **e)** $\alpha = 2$.

5. Dacă $\log_3 2 = a$ şi $\log_3 5 = b$, atunci $\log_3 20$ este:
a) $2a + b$; **b)** $2a - b$; **c)** $2ab$; **d)** $a + b$; **e)** $a - b$.

6. Rangul termenului din dezvoltarea $\left(\sqrt[5]{x} + \frac{1}{\sqrt{x}}\right)^{21}$ în care nu apare x, este:
a) T_7; **b)** T_9; **c)** T_8; **d)** T_6; **e)** T_{10}.

7. Fie $z_1 = 1 - m + i$ şi $z_2 = m + 1 - 2mi$, unde $i^2 = -1$. Valorile lui $m \in \mathbf{R}$ pentru care $z_1 \cdot z_2 \in \mathbf{R}$ sunt:
a) $m \in \Phi$; **b)** $m \in \{1;2\}$; **c)** $m \in \{-1;5\}$; **d)** $m \in \{0;2\}$; **e)** $m \in \{-3;-2\}$.

8. Dacă $\cos\alpha = -\frac{1}{5}$ şi $\alpha \in \left(\pi, \frac{3\pi}{2}\right)$, atunci $\sin\alpha$ are valoarea:
a) $-\frac{2\sqrt{6}}{5}$; **b)** $\frac{\sqrt{3}}{2}$; **c)** $-\frac{1}{2}$; **d)** $\frac{1}{2}$; **e)** $\frac{2\sqrt{6}}{5}$.

9. Fie ecuația $x^3 + x + 1 = 0$. Atunci valoarea determinantului $\Delta = \begin{vmatrix} x_1 & x_2 & x_3 \\ x_3 & x_1 & x_2 \\ x_2 & x_3 & x_1 \end{vmatrix}$ este:
a) $\Delta = 0$; **b)** $\Delta = 1$; **c)** $\Delta = -1$; **d)** $\Delta = 2$; **e)** $\Delta = -2$.

10. Ecuația $2^x(x^2 + 1) - 3 = 0$ are soluție în intervalul:
a) $(0;1)$; **b)** $(-1;0)$; **c)** $(3;\infty)$; **d)** $(2;3)$; **e)** $(-2;-1)$.

11. Valorile parametrilor reali m şi n astfel încât ecuația $x^3 + x^2 + mx - n = 0$ să admită rădăcina dublă $x = -1$ sunt:
a) $m = -1, n = 1$; **b)** $m = -2, n = -1$; **c)** $m = n = 1$; **d)** $m = 1, n = -1$; **e)** $m = -1, n = 2$.

12. Valorile parametrului $m \in \mathbf{R}$ pentru care ecuația $4x^3 - 3x + 1 - m = 0$ admite toate soluțiile reale distincte, sunt:
a) $m \in (0;2)$; **b)** $m \in (-\infty,0) \cup (2,\infty)$; **c)** $m \in (-1;0)$; **d)** $m \in (0;1)$; **e)** $m \in \Phi$.

13. Valoarea limitei $\lim\limits_{x\to 0}\dfrac{x-arctg\,x}{x^3}$ este:

a) $\dfrac{1}{3}$**;** **b)** 0**;** **c)** ∞**;** **d)** 3**;** **e)** 1**.**

14. Rezultatul integralei $\int\limits_{e}^{e^2}\dfrac{\ln x}{x}dx$ este:

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

15. Volumul corpului obținut prin rotația graficului funcției $f:[0;3]\to\mathbf{R}, f(x)=\sqrt{\dfrac{x(x-3)}{x-4}}$ în jurul axei Ox este:

a) $\pi\left(\dfrac{15}{2}-8\ln 2\right)$**;** **b)** $\pi\left(\dfrac{7}{2}-8\ln 2\right)$**;** **c)** $\pi\left(\dfrac{3}{2}-8\ln 2\right)$**;** **d)** $\pi\left(\dfrac{15}{2}+8\ln 2\right)$**;** **e)** $\pi\left(\dfrac{15}{2}+2\ln 2\right)$**.**

Rezolvare subiect matematică
Varianta II

1.

$$S=-\frac{b}{a}=1;$$

$$P=\frac{c}{a}=m+1;$$

$$\frac{1}{x_1}+\frac{1}{x_2}=1\Leftrightarrow\frac{x_2+x_1}{x_1x_2}=1\Leftrightarrow\frac{1}{m+1}=1\Rightarrow m=0.$$

2.

$$\left.\begin{aligned}x_v&=-\frac{b}{2a}=\frac{1-m}{m}\\ y_v&=-\frac{\Delta}{4a}=\frac{m-1}{m}\end{aligned}\right\}\Rightarrow x_v+y_v=0.$$

Ecuația dreptei pe care se găsesc vârfurile parabolelor P_m asociate funcțiilor f_m este $x+y=0$.

3.

$$\left.\begin{aligned}\overrightarrow{AB}&=\vec{i}+3\vec{j}\\ \overrightarrow{AC}&=2\vec{i}+(m-2)\vec{j}\end{aligned}\right\}\Rightarrow\overrightarrow{AB}\cdot\overrightarrow{AC}=3m-4;$$

$$\overrightarrow{AB}\cdot\overrightarrow{AC}=5\Leftrightarrow 3m-4=5\Rightarrow m=3.$$

4. $(d_1):\alpha x+(\alpha-1)y-3=0;\ m_{d_1}=\dfrac{\alpha}{1-\alpha}$

$(d_2):2x-(\alpha+1)y+1=0;\ m_{d_2}=\dfrac{2}{\alpha+1}$

$$d_1\parallel d_2\Leftrightarrow m_{d_1}=m_{d_2}\Leftrightarrow\frac{\alpha}{1-\alpha}=\frac{2}{\alpha+1}\Rightarrow\alpha^2+3\alpha-2=0;\alpha\in\left\{\frac{-3-\sqrt{17}}{2};\frac{-3+\sqrt{17}}{2}\right\}.$$

5. $$\log_3 20=\log_3(4\cdot5)=\log_3 4+\log_3 5=2\underbrace{\log_3 2}_{a}+\underbrace{\log_3 5}_{b}=2a+b.$$

6. $$T_{k+1}=C_n^k a^{n-k}b^k=C_{21}^k\cdot\left(x^{\frac{1}{5}}\right)^{21-k}\cdot\left(x^{-\frac{1}{2}}\right)^k=C_{21}^k\cdot x^{\frac{21-k}{5}-\frac{k}{2}};\ \frac{21-k}{5}-\frac{k}{2}=0\Rightarrow k=6.$$

Rangul termenului din dezvoltare în care nu apare x este T_7.

7.

$$\left.\begin{aligned}z_1&=1-m+i\\ z_2&=m+1-2mi\end{aligned}\right\}\Rightarrow z_1\cdot z_2=1+2m-m^2+\left(2m^2-m+1\right)i;$$

$$z_1\cdot z_2\in R\Rightarrow 2m^2-m+1=0;\Delta<0\Rightarrow m\in\Phi.$$

8. $$\alpha\in\left(\pi,\frac{3\pi}{2}\right)\Rightarrow\sin\alpha<0;$$

$$\sin\alpha=-\sqrt{1-\cos^2\alpha}=-\sqrt{1-\frac{1}{25}}=-\frac{2\sqrt{6}}{5}.$$

9. Relațiile lui Viete: $\begin{cases} x_1+x_2+x_3=0 \\ x_1x_2+x_1x_3+x_2x_3=1; \\ x_1x_2x_3=-1 \end{cases}$

$$\Delta=\begin{vmatrix} x_1 & x_2 & x_3 \\ x_3 & x_1 & x_2 \\ x_2 & x_3 & x_1 \end{vmatrix}=\begin{vmatrix} x_1+x_2+x_3 & x_2 & x_3 \\ x_1+x_2+x_3 & x_1 & x_2 \\ x_1+x_2+x_3 & x_3 & x_1 \end{vmatrix}=\begin{vmatrix} 0 & x_2 & x_3 \\ 0 & x_1 & x_2 \\ 0 & x_3 & x_1 \end{vmatrix}=0.$$

10. Fie $f(x)=2^x(x^2+1)-3$.

$\left.\begin{matrix} f(0)=-2 \\ f(1)=1 \end{matrix}\right\} \Rightarrow f(0)\cdot f(1)\le 0 \Rightarrow$ soluția se găsește în intervalul $(0;1)$.

11. $x=-1$ rădăcină dublă $\Leftrightarrow f(-1)=f'(-1)=0$.

$f(-1)=0 \Leftrightarrow m+n=0$

$f'(-1)=0 \Leftrightarrow 1+m=0$

$\begin{cases} m+n=0 \\ 1+m=0 \end{cases} \Rightarrow m=-1, n=1.$

12. $f'(x)=0 \Rightarrow 12x^3-3=0;\ x_1=-\frac{1}{2},\ x_2=\frac{1}{2}$

x	$-\infty$		$-\frac{1}{2}$		$\frac{1}{2}$		$+\infty$
$f(x)$	-		$\underbrace{2-m}_{+}$		$\underbrace{-m}_{-}$		+

Ecuația admite toate rădăcinile reale, distincte: $\begin{cases} 2-m>0 \\ -m<0 \end{cases} \Rightarrow m\in(0;2)$.

13. $\lim\limits_{x\to 0}\frac{x-arctg\,x}{x^3}\overset{\frac{0}{0}}{\underset{l'H}{=}}\lim\limits_{x\to 0}\frac{1-\frac{1}{1+x^2}}{3x^2}\overset{\frac{0}{0}}{\underset{l'H}{=}}\lim\limits_{x\to 0}\frac{\left(1+x^2\right)^{-2}2x}{6x}=\frac{1}{3}\lim\limits_{x\to 0}\frac{1}{\left(1+x^2\right)^2}=\frac{1}{3}.$

14. $t=\ln x \Rightarrow dt=\frac{dx}{x};$

$x_1=e \Rightarrow t_1=1;$

$x_2=e^2 \Rightarrow t_2=2;$

$\int\limits_e^{e^2}\frac{\ln x}{x}dx=\int\limits_1^2 t\,dt=\frac{t^2}{2}\Big|_1^2=\frac{3}{2}.$

15.

$$V=\pi\int\limits_0^3 f^2(x)\,dx=\pi\int\limits_0^3\frac{x(x-3)}{x-4}\,dx=\pi\int\limits_0^3\left(x+1+\frac{4}{x-4}\right)dx$$

$$=\pi\left(\frac{x^2}{2}+x+4\ln|x-4|\right)\Big|_0^3=\pi\left(\frac{15}{2}-8\ln 2\right).$$