

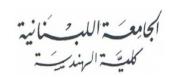
ANALYTIC SPACE GEOMETRY

The space is referred to a direct orthonormal system $(O; \vec{i}, \vec{j}, \vec{k})$

Consider the point A(1; 2; 3), the straight line (d): (x = t - 1; y = t; z = -t + 5) where $t \in IR$ and the planes (P): 2x + y + 3z + 1 = 0, (Q): 3x - 2y + z + 12 = 0 and (R): x + 2y + 3z = 0.

- **1-** The orthogonal projection of A on the plane (P) is the point A_1 of coordinates:
 - a) (1; -2; -3).
 - b) (-3;0;-3).
 - c) (3;-1;-2).
 - d) none of the above answers is correct.
- **2-** The orthogonal projection of A on the axis of abscissas is the point A_2 of coordinates :
 - a) (1;2;0).
 - b) (1;0;0).
 - c) (-1;0;0).
 - d) (0;2;3).
- **3-** The distances d_1 , d_2 , d_3 from A to the planes (P), (Q), (R) respectively are such that :
 - a) $d_1 = d_2 = 2d_3$.
 - b) $d_1 = d_2 = 14$ and $d_3 = \sqrt{14}$.
 - c) $d_1 = d_2 = d_3 = \sqrt{14}$.
 - d) $d_1 = d_3 = \sqrt{14}$ and $d_2 = \frac{22}{\sqrt{14}}$.
- **4-** A system of parametric equations of the line of intersection of the planes (Q) and (R) is:
 - a) x = m; y = 2m + 9; z = -m 3 where $m \in IR$.
 - b) x = m; y = -m + 4.5; z = -m + 3 where $m \in IR$.
 - c) x = m; y = m + 4.5; z = -m 3 where $m \in IR$.
 - d) x = m; y = m + 4.5; z = m 3 where $m \in IR$.
- 5- An equation of the plane parallel to (P) passing through the symmetric of A with respect to O is:
 - a) 2x + y + 3z + 13 = 0.
 - b) 2x + y + 3z 13 = 0.
 - c) 2x + y + 3z + 26 = 0.
 - d) x+2y+3z-13=0.





COMPLEX NUMBERS

The complex plane is referred to a direct orthonormal system $(O; \overrightarrow{u}, \overrightarrow{v})$.

Consider the points A, B and L of affixes $z_A = 5 - 4i$, $z_B = 6 + 3i$ and $z_L = 2$ and the circle (γ) of center L and radius 5.

6- A second degree equation whose roots are the affixes of A and B is:

a)
$$z^2 - (11-i)z + 42 - 9i = 0$$
.

b)
$$z^2 + (11-i)z + 42-9i = 0$$
.

c)
$$z^2 - (11-i)z + 28-9i = 0$$
.

d)
$$z^2 - (11-i)z + 42-9i = 0$$
.

7- The circle (γ) is the set of points M of affix z such that:

a)
$$zz + 2z + 2z - 25 = 0$$
.

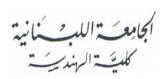
b)
$$zz + z + z - 21 = 0$$
.

c)
$$z\bar{z} - 2z - 2\bar{z} - 21 = 0$$
.

d)
$$zz + 2z - 2z - 25 = 0$$
.

- **8** The points A and B are such that :
 - a) A belongs to (γ) and B is exterior to (γ) .
 - b) A is interior to (γ) and B is exterior to (γ) .
 - c) A and B are interior to (γ) .
 - d) none of the above answers is correct.
- **9** If C is the point with affix $1-2i\sqrt{6}$, then:
 - a) the symmetric of C with respect to the axis of ordinates belongs to (γ) .
 - b) the symmetric of C with respect to the axis of abscissas belongs to (γ) .
 - c) the symmetric of ${\it C}$ with respect to the point ${\it L}$ belongs to (γ) .
 - d) the symmetric of \mathcal{C} with respect to the origin \mathcal{O} belongs to (γ) .





10- The measure of the angle $(\overrightarrow{LA}; \overrightarrow{LB})$ in the interval $]-\pi; \pi]$ is:

- a) $-\frac{\pi}{2}$.
- b) $-\frac{\pi}{3}$.
- c) $\frac{2\pi}{3}$.
- d) $\frac{\pi}{2}$.

SEQUENCES

 (U_n) , $n\!\geq\!1$, is a geometric sequence such that $\,U_3=-5\,$ and $\,U_6=40\,$.

11- $U_{10} = .$

- a) 320.
- b) 640.
- c) -640.
- d) -320.

12- The sequence (U_n) is:

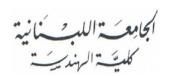
- a) decreasing.
- b) increasing.
- c) periodic.
- d) not monotonic.

 (V_n) is the sequence of first term $V_0=2$ such that , for all n in IN , $V_{n+1}=1-\frac{1}{V_n}$.

13- The sequence (V_n) is:

- a) decreasing.
- b) increasing.
- c) periodic of period 3.
- d) periodic of period 4.





- **14-** The sequence (V_n) :
 - a) has an upper bound and no lower bound.
 - b) has an lower bound and no upper bound.
 - c) is bounded by -1 and 2.
 - d) is bounded by $\frac{1}{2}$ and 2.
- 15- $\lim_{n\to+\infty} V_n$:
 - a) is a real number.
 - b) is $+\infty$.
 - c) is $-\infty$.
 - d) none of the above answers is correct.

PROBABILITY

A die is weighted so that , when it is rolled , the probability that an even number appears is equal to $0.6\,$.

The die is rolled 6 times.

16- The probability that each of the 6 faces appears once is equal to :

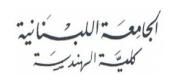
- a) $(0.4)^3 + (0.6)^3$.
- b) $20 \times (0.4)^3 \times (0.6)^3$.
- c) $6 \times (0.4)^3 \times (0.6)^3$.
- d) none of the above answers is correct.

The die is rolled 5 times.

17- The probability of getting exactly 3 even numbers is equal to :

- a) $10 \times (0.4)^3 \times (0.6)^2$.
- b) $(0.4)^2 \times (0.6)^3$.
- c) $10 \times (0.4)^2 \times (0.6)^3$.
- d) none of the above answers is correct.





18- The probability of getting at least one odd number is equal to :

- a) $(0.4)^5$.
- b) $1-(0.6)^5$.
- c) $1-(0.4)^5$.
- d) none of the above answers is correct.

The die is rolled 3 times.

19- The probability of getting three numbers whose sum is odd is equal to:

- a) $(0.4) \times (0.6)^2$.
- b) $(0.4) \times (0.6)^2 + (0.4)^3$.
- c) $3 \times (0.4) \times (0.6)^2 + 3 \times (0.4)^3$.
- d) $3\times(0.4)\times(0.6)^2+(0.4)^3$.

20- The probability of getting the same number is

- a) $(0.4)^3 + (0.6)^3$.
- b) $(0.4)^3 \times (0.6)^3$.
- c) $3(0.4)^3 + 3(0.6)^3$.
- d) non of the above answers is correct.

EQUATIONS AND INEQUALITIES

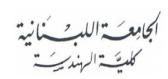
21- The solution set of the equation $\ell n(x-1) + \ell n(x-3) = 3\ell n2$ is:

- a) $]3; +\infty[$.
- b) $\{-1;5\}$.
- c) $\{-5\}$.
- d) {5}.

22- The solution set of the inequality $2 \ln(x-1) - \ln(5-x) - \ln 2 \le 0$ is:

- a) [-3;3].
- b) [1;3].
- c)]1; 5].
- d) none of the above answers is correct.



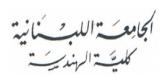


- 23- The solution set of the equation $\exp(\ln(7-x^2)) = x^2 7$ is:
 - a) ϕ .
 - b) $\{\sqrt{7}\}$.
 - c) $\left\{-\sqrt{7}; \sqrt{7}\right\}$.
 - d) none of the previous answers is correct.
- **24-** The solution set of the equation $(\ln x)^2 \ln x = 12$ is:
 - a) $\{-3; 4\}$.
 - b) $\{e^4\}$.
 - c) $\{e^{-3}; e^{4}\}$. d) $\{e^{3}; e^{-4}\}$.
- **25-** The solution set of the inequality $e^{2x} 2e^x 3 \le 0$ is:
 - a) [-1;3].
 - b) [0;3].
 - c) $]-\infty$; $\ell n3$].
 - d) $]1; \ell n 3[$.

INTEGRALS

- 26- $\int_{0}^{\infty} \frac{e^{x}}{e^{x}-4} dx$ is equal to:
 - a) $\ell n(1.5)$.
 - b) $\ell n 2 \ell n 3$.
 - c) $\ell n 2 \ell n 4$
 - d) none of the above answers is correct.
- 27- $\int_{-\infty}^{1} \frac{dx}{x(\ell nx 2)}$ is equal to:
 - a) $\ell n2$.
 - b) 2.
 - c) $-\ell n2$.
 - d) none of the above answers is correct.





28-
$$\int_{2}^{-2} x e^{-x^4} dx$$
 is equal to :

- a) $2e^{16}$.
- b) 0.
- c) $-2e^{16}$.
- d) none of the above answers is correct.

The function f is defined on]0; $+\infty[$ by $f(x) = \int_{1}^{x} (\ell nt)^{6} dt$.

- **29-** The function f is:
 - a) positive on $]0; +\infty[$.
 - b) negative on $]0; +\infty[$.
 - c) positive on]0; 1[and negative on]1; $+\infty$ [.
 - d) negative on]0; 1[and positive on]1; $+\infty$ [.
- **30-** The function f is:
 - a) decreasing on $]0; +\infty[$.
 - b) increasing on $]0; +\infty[$.
 - c) increasing on]0; 1[and decreasing on]1; $+\infty$ [.
 - d) decreasing on]0; 1[and increasing on]1; $+\infty$ [.

DIFFERENTIAL EQUATIONS

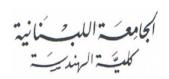
The plane is referred to a direct orthonormal system $(O; \overrightarrow{i}, \overrightarrow{j})$

(E) is the differential equation 3y'+2y-6=0.

31- If f is a solution of (E) then f' is a solution of the differential equation :

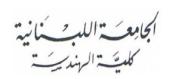
- a) 3y'-2y=0.
- b) 3y' + 2y = 0.
- c) 3y''+2y'-6=0.
- d) none of the previous answers is correct.





- **32-** The solution y of (E) such that y(0) = 1 is such that :
 - a) $y(x) = 3e^{-\frac{2}{3}x} + 3$.
 - b) $y(x) = -2e^{\frac{2}{3}x} 3$.
 - c) $y(x) = -2e^{-\frac{2}{3}x} + 3$.
 - d) none of the previous answers is correct.
- **33-** The function g is the solution of (E) whose representative curve (γ) passes through O. An equation of the tangent to (γ) at O is :
 - a) y = x + 1.
 - b) y = -2x.
 - c) y = 2x.
 - d) y = 2x + 3.
- (F) is the differential equation $(x^2 + 3) y' x y = 0$.
- **34-** The solution y of (F) that satisfies y(1) = 4 is such that:
 - a) $y(x) = 3 \ln x + 2x + 2$.
 - b) $y(x) = 2\sqrt{x^2 + 3}$.
 - c) $y(x) = \sqrt{x^2 + 3} 3x$.
 - d) none of the previous answers is correct.
- **35-** Let (C) be the representative curve of the general solution of (F). The slope of tangent to (C) at the point of intersection with the axis of ordinates is equal to:
 - a) 3.
 - b) -3.
 - c) 0.
 - d) 1.





FUNCTIONS

The plane is referred to a direct orthonormal system (O; \overrightarrow{i} , \overrightarrow{j})

36- The function
$$f$$
 defined on IR **by** $f(x) = \begin{cases} x^2 - x - 1 & if & x \le 1 \\ \sqrt{2x - 1} - 2 & if & x > 1 \end{cases}$ is:

- a) differentiable and not continuous at 1.
- b) continuous and not differentiable at 1.
- c) continuous and differentiable at 1.
- d) none of the previous answers is correct.

The function h is defined on
$$IR - \{0\}$$
 by $h(x) = \frac{e^x - 2}{e^x - 1}$.

37-
$$\lim_{x \to -\infty} h(x) = \ell_1$$
 and $\lim_{x \to +\infty} h(x) = \ell_2$ where :

- a) $\ell_1 = -\infty$ and $\ell_2 = +\infty$.
- b) $\ell_1 = 2$ and $\ell_2 = 1$.
- c) $\ell_1 = 1$ and $\ell_2 = 2$.
- d) none of the previous answers is correct.

38-
$$\lim_{x\to 0^-} h(x) = L_1$$
 and $\lim_{x\to 0^+} h(x) = L_2$ where:

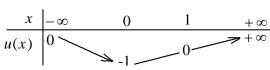
- a) $L_1 = +\infty$ and $L_2 = -\infty$.
- b) $L_1 = +\infty$ and $L_2 = 0$.
- c) $L_1 = 0$ and $L_2 = -\infty$.
- d) none of the previous answers is correct.

Given the table of variations of a differentiable function u defined on IR.

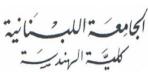
Let f be the function defined on IR by $f(x) = u(x) \times e^{x}$.

39-
$$f$$
 is differentiable and $f'(x) = :$

- a) $u'(x) \times e^x$.
- b) $(u'(x) u(x))e^x$.
- c) $(u'(x)+u(x))e^x$.
- d) none of the previous answers is correct.







- **40-** The sense of variation of f in each of the interval $I =]-\infty$; 0[and J =]0; 1[is such that :
 - a) f is decreasing in I and increasing in J.
 - b) f is increasing in I and decreasing in J.
 - c) f is increasing in each of I and J.
 - d) f is increasing in I and its sense of variation can not be determined in J.

The function f is defined on]0; $+\infty[$ by $f(x) = x(\ell n^2 x + 1)$.

- Let (C) be the representative curve of f.
- **41-** (C) is tangent to the straight line (d) of equation y = x at a point A of coordinates:
 - a) $(e^{-1}; e^{-1})$.
 - b) (1;1).
 - c) $(e^{-2}; e^{-2})$.
 - d) (e; 2e).
- **42-** f has an inverse function f^{-1} defined on the interval :
 - a) $]0; +\infty[$.
 - b) $]-\infty;0[.$
 - c) $[0; +\infty[$.
 - d)] $-\infty$; $+\infty$ [.
- **43-** The function g is defined on]0; $+\infty[$ by $g(x) = \frac{1}{f(x)}$.

Let (γ) be the representative curve of g.

The common point of (γ) and (C) is the point of coordinates:

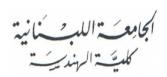
- a) $(e^{-1}; e^{-1})$.
- b) (1;1).
- c) (-1;-1).
- d) none of the previous answers is correct .

The function F is defined on IR by $F(x) = e^x - e^{-x} - 2x$.

Let (L) be the representative curve of F.

- **44-** The function F is differentiable and F'(x) = :
 - a) $e^x e^{-x} 2$.
 - b) $2e^x 2$.





c)
$$e^{-x}(e^x-1)^2$$
.

d)
$$e^x(e^{-2x}-e^{-x}+1)$$
.

45- The straight line (Δ) of equation y = -2x - 4 cuts (L) at the point(s) of abscissa(s):

a)
$$-2-\sqrt{5}$$
 and $-2+\sqrt{5}$.

b)
$$\ell n(-2 + \sqrt{5})$$
 and $\ell n(-2 - \sqrt{5})$.

c)
$$\ln(\sqrt{5}-2)$$
 and $-\ln(\sqrt{5}-2)$.

d)
$$\ln(\sqrt{5}-2)$$
.

TRANSFORMATIONS

The plane is referred to a direct orthonormal system $(O; \overrightarrow{u}, \overrightarrow{v})$

f is the transformation defined by the complex relation z' = -2z + 4 + i;

g is the transformation defined by the complex relation z' = (1-i)z + 1 + 2i .

46- The image by f of the circle of center O and radius 3 is :

- a) The circle of center (-2; 0) and radius 2.
- b) The circle of center (1; 4) and radius 6.
- c) The circle of center $(\frac{4}{3}; \frac{1}{3})$ and radius 6.
- d) The circle of center (4;1) and radius 6.

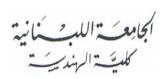
47- The area, in units of area, of the image by g of a circle of radius 3 is equal to:

- a) 9π .
- b) 18π .
- c) $9\sqrt{2}\pi$.
- d) 81π .

48- $f \circ g$ is a similitude whose ratio and angle are respectively equal to :

- a) 2; $-\frac{\pi}{4}$ rad.
- b) $2\sqrt{2}$; $\frac{3\pi}{4}$ rad.
- c) $-2\sqrt{2}$; $-\frac{\pi}{4}$ rad.
- d) $2\sqrt{2}$; $\frac{\pi}{4}$ rad.





49- $g \circ f$ is a similar whose ratio and angle are respectively equal to :

a)
$$2\sqrt{2}$$
 ; $-\frac{3\pi}{4}$ rad.

b)
$$2\sqrt{2}$$
 ; $\frac{\pi}{4}$ rad.

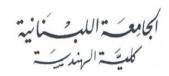
c)
$$2\sqrt{2}$$
 ; $-\frac{\pi}{4}$ rad.

d)
$$2\sqrt{2}$$
 ; $\frac{3\pi}{4}$ rad.

50- $f \circ g(O) = A$ and $g \circ f(O) = B$ where :

- a) A(2; -3) and B(2; -3).
- b) A(6;-1) and B(6;-1).
- c) A(2; -3) and B(6; -1).
- d) none of the previous answers is correct.





Grille de correction

Question	Réponse	Question	Réponse
1	d	26	b
2	b	27	a
3	c	28	b
4	c	29	d
5	a	30	b
6	a	31	b
7	c	32	С
8	d	33	c
9	b	34	b
10	d	35	c
11	b	36	c
12	d	37	b
13	c	38	a
14	c	39	c
15	d	40	d
16	b	41	b
17	c	42	a
18	b	43	b
19	d	44	c
20	c	45	d
21	d	46	d
22	d	47	b
23	a	48	b
24	c	49	d
25	c	50	c