Egypt-Japan University of Science and Technology *Sample Entrance Exam (Undergraduate)*		
Faculty of International Business and Humanities	**Subject: Mathematics**	
Academic Year: 2021/2022	**No. of Pages: 3**	
Exam Duration: 1 hr	**Exam Version:**	
Student Name:	**Student ID:**	

Choose the correct answer:

Question ① If $x^2 + b = (x - 4)(x + 4)$ then b equals:

a) 4
b) –4
c) 16
d) –16

Question ② If $x + z < 20$, and $2x - z > 24$, then a possible value for (x, z) is:

a) (15,6)
b) (10, 15)
c) (15, –4)
d) (18, 6)

Question ③ If $3x - 80$, $1.5x$, and $2x$ are the three angles of a triangle, find the measure of the largest angle of the triangle.

a) 60
b) 40
c) 80
d) 90

Question ④ In the sequence 5, 20, 80, x, 1280 …, what is the value of x?

a) 100
b) 320
c) 1000
d) 1100

Question ⑤ What are the x and y intercepts of the equation $6x - 3y - 15 = 0$?

a) (0, 2.5) and (0, –5)
b) (0, 2) and (0, 5)
c) (2, 0) and (0, 4)
d) (2.5, 0) and (0, – 5)

Question ⑥ The expression $\log x + 2\log y - \log z$ simplifies to:

a) $\log(xy^2 - z)$
b) $\log(2xy - z)$
c) $\log\frac{2xy}{z}$
d) $\log\frac{xy^2}{z}$

Question ⑦ Let $z(x) = x^3 + kx^2 - 4x - 12$, where k is a constant. Given that $x + 1$ is a factor of $z(x)$, then the value of k is:

a) -3
b) 3
c) 9
d) -9

Question ⑧ If the sum of two numbers is 12 and their product is 32, then these two numbers are the roots of which of the following equations?

a) $x^2 + 12x + 32 = 0$
b) $2x^2 + 2x + 12 = 0$
c) $x^2 - 2x + 12 = 0$
d) $x^2 - 12x + 32 = 0$

Question ⑨ The equation of the straight line that passes by the two points (1, 1) and (2, 3) is:

a) $y + 2x + 1 = 0$
b) $y - 2x - 1 = 0$
c) $y + 2x - 1 = 0$
d) $y - 2x + 1 = 0$

Question ⑩ What is the midpoint of the line segment joining the two points (7, 2) and (3, 6)?

a) (5, 4)
b) (6, 3)
c) (4, 5)
d) (7, 6)

Question ⑪ Let $\begin{pmatrix} a & 1 \\ b & 2 \end{pmatrix}\begin{pmatrix} 3 \\ -1 \end{pmatrix} = \begin{pmatrix} 2 \\ 7 \end{pmatrix}$, then the value of $a + b$ is:

a) 3
b) -3
c) 4
d) -4

Question ⑫ The set of real values of x for which

$$x^2 - x - 6 < 0,$$

is:

a) $(-2,3)$
b) $(2,3)$
c) $(1,-3)$
d) $(1,3)$

Question ⑬ The intersection point between the two lines

$$x - y + 1 = 0, \quad x + 3y - 7 = 0,$$

is:

a) $(1,1)$
b) $(1,2)$
c) $(2,1)$
d) $(2,2)$

Question ⑭ If $A = \begin{pmatrix} -1 & 1 \\ 0 & 3 \end{pmatrix}, B = \begin{pmatrix} 1 & -2 \\ 2 & -1 \end{pmatrix}$, then $(A+B)^2$ equals:

a) $\begin{pmatrix} -2 & -2 \\ 4 & 2 \end{pmatrix}$
b) $\begin{pmatrix} 2 & -2 \\ 4 & 0 \end{pmatrix}$
c) $\begin{pmatrix} 0 & 2 \\ 2 & -4 \end{pmatrix}$
d) $\begin{pmatrix} -2 & 2 \\ -4 & 0 \end{pmatrix}$

Question ⑮ If the product of *x* and *y* is smaller than zero, which of the following cannot be ngative?

a) $x - y$
b) $y - x$
c) $x\,y^2$
d) $x^2 y^2$

Best Wishes for all