


Egypt-Japan University of Science and Technology
Entrance Exam (Undergraduate)

Faculty of Engineering	Subject: Mathematics	 <p style="font-size: small; margin: 0;"> الجامعة المصرية اليابانية للعلوم والتكنولوجيا E-JUST Egypt-Japan University of Science and Technology エジプト日本科学技術大学 </p>
Academic Year: 2026/2027	No. of Pages: 3	
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Student Name:	Student ID:	

Choose the correct answer

Question 1 If $\frac{A}{2x-1} + \frac{B}{x} = \frac{2}{2x^2-x}$, then A, B equals

- A) 2, 4 B) -1, 3 C) 1, 1 D) 2, 4

Question 2 Given $f(x) = x^2 - 4x + b$, where b is a real number. Let M and m be the maximum and minimum values of $f(x)$ over the interval $a \leq x < 5$, where $0 < a < 5$. For $0 < a \leq 2$, $(M, m) =$

- A) $(b + 4, b - 5)$ B) $(b + 5, b - 4)$ C) $(b + 4, 0)$ D) $(b + 5, b)$

Question 3 Let A be a 3×3 matrix such that $\left(A + \begin{bmatrix} 1 & 2 & 3 \\ 4 & 0 & 10 \\ -1 & 2 & 5 \end{bmatrix} \right)^t = \begin{bmatrix} -1 & 5 & 1 \\ 10 & 2 & 5 \\ 3 & -2 & 9 \end{bmatrix}$. The sum of all elements of the matrix A is

- A) 7 B) 6 C) 9 D) -6

Question 4 Consider the two points $A(0, 1, -2), B(1, 2, -1)$. Let \vec{a}, \vec{b} be the position vectors of the two points A, B . Let $\vec{c} = \vec{a} + t\vec{b}$, where t is a real number. $|\vec{c}|$ is minimized at $t =$

- A) $-2/3$ B) $1/3$ C) $-1/3$ D) $2/3$

Question 5 Assume that a die is thrown three times. Let x, y, z be the appearing numbers on the first, second, and third toss, respectively. Define A to be the event where $x = y = z$, and B to be the event where $x + y = z$. The number of elements in A equals

- A) 1 B) 6 C) 30 D) 36

Question 6 Consider the arithmetic sequence $-2, 2, \dots, 4n - 2$. If the sum of this sequence equals 96, then n equals

- A) 8 B) 7 C) 10 D) 9

Question 7 Evaluate the following integral $\int \ln(x + 1) dx$

- A) $(x - 1) \ln(x + 1) - x + c$ B) $(x - 1) \ln(x + 1) + x + c$
 C) $(x + 1) \ln(x + 1) - x + c$ D) $(x + 1) \ln(x + 1) + x + c$

Question 8 Evaluate the following integral $\int x^3\sqrt{x-1}dx$

- A) $\frac{7(x-1)^{7/3}}{3} - \frac{4(x-1)^{4/3}}{3} + c$ B) $\frac{3(x-1)^{7/3}}{7} - \frac{3(x-1)^{4/3}}{4} + c$
 C) $\frac{7(x-1)^{7/3}}{3} + \frac{4(x-1)^{4/3}}{3} + c$ D) $\frac{3(x-1)^{7/3}}{7} + \frac{3(x-1)^{4/3}}{4} + c$

Question 9 A club has 15 members. They need to elect a President, a Vice-President, and a Secretary. How many different ways can these positions be filled?

- A) 455 B) 1,365 C) 2,730 D) 3,375

Question 10 For $f(x) = x^2 + ax + b$, if $f'(1) = 5$, and the equation of the tangent line to $f(x)$ at $x = 1$ is $y = 5x - 2$, find the values of a and b .

- A) $a = 1, b = -3$ B) $a = 3, b = -1$ C) $a = 3, b = -6$ D) $a = 6, b = -3$

Question 11 If $y = \cot((x^2 + 3)^3)$, then $\frac{dy}{dx}$ equals to

- A) $-2x \csc^2((x^2 + 3)^3)$ B) $-6x \csc^2((x^2 + 3)^3)$
 C) $-6x(x^2 + 3)^2 \csc^2((x^2 + 3)^3)$ D) $-\csc^2((x^2 + 3)^3)$

Three forces act on the screw eye, the lines of action are shown in Figure 1,

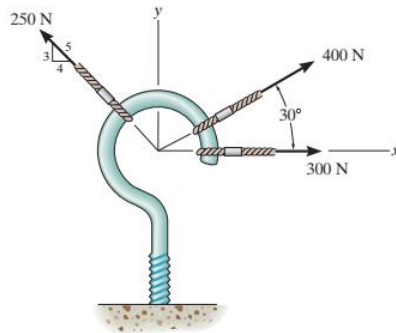


Figure 1

Question 12

The magnitude of the resultant force F_R is

- a) $F_R = 446 \text{ N}$
 b) $F_R = 350 \text{ N}$
 c) $F_R = 567 \text{ N}$
 d) $F_R = 496 \text{ N}$

Question 13

The direction angle θ of the resultant force F_R of Figure 1, will:

- a) θ lies in the first quadrant.
 b) θ lies in the second quadrant.
 c) θ lies in the third quadrant.
 d) θ lies in the fourth quadrant.

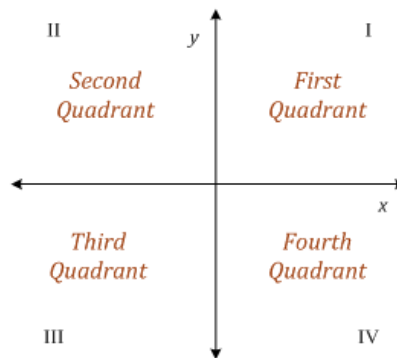


Figure 2

Question 14

Initially, the car, see Figure 3, travels along a straight road with a speed of 35 m/s. If the brakes are applied and the speed of the car is reduced to 10 m/s in 25 s. The constant deceleration of the car is

- A) $a = 0 \text{ m/s}^2$
- B) $a = 1 \text{ m/s}^2$
- C) $a = -2 \text{ m/s}^2$
- D) $a = -1 \text{ m/s}^2$



Figure 3

Question 15 A motorcycle starts from rest and moves with a constant acceleration of 2 m/s^2 . What are its velocity and displacement after 9 seconds?

- A) 18(m/s), 81(m) B) 18(m/s),162(m) C) 9(m/s),81(m) D) 20(m/s),90(m)

Best Wishes for all