


Egypt-Japan University of Science and Technology <i>Entrance Exam (Undergraduate)</i>		
Faculty of Engineering	Subject: Mathematics	 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
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Student Name:	Student ID:	

Choose the correct answer

Question 1: Consider the arithmetic sequence $-2, 2, \dots, 4n - 2$. How many terms are there in this sequence?

- A) n B) $2n$ C) $n - 1$ D) $n + 1$

Question 2: Consider the two points $A(1, -1, 0), B(-2, 1, 2)$. 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) $1/6$ B) $1/3$ C) $1/2$ D) $1/9$

Question 3: 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 $x + y + z = 6$. The number of elements in A equals

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

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

If $AX = \begin{bmatrix} 6 & 14 \\ -9 & 19 \\ 9 & 16 \end{bmatrix}$, then the sum of the elements of X is

- A) 6 B) 8 C) 10 D) 12

Question 5 Suppose that $f(t)$ is a linear function in t . Let $F(x) = x \int_1^{2x+3} f(t) dt$.

If $F(1) = 2, F'(0) = -10$, then $f(t) =$

- A) $\frac{11}{2}t - 16$ B) $11t - 16$ C) $11t + 16$ D) $\frac{11}{2}t + 16$

Question 6: Evaluate the following integration $\int x^2 e^x dx$

- A) $e^x(x^2 - 2x + 2) + c$ B) $e^x \frac{x^3}{3} + c$
 C) $e^x(x^2 + 2x) + c$ D) $e^x(x^2 + 2x - 2) + c$

Question 7: Evaluate the following integration $\int x\sqrt{x-1}dx$

- A) $\frac{2(x-1)^{5/2}}{5} + \frac{2(x-1)^{3/2}}{3} + c$ B) $\frac{5(x-1)^{5/2}}{2} + \frac{3(x-1)^{3/2}}{2} + c$
 C) $\frac{2(x-1)^{5/2}}{5} - \frac{2(x-1)^{3/2}}{3} + c$ D) $\frac{5(x-1)^{5/2}}{2} - \frac{3(x-1)^{3/2}}{2} + c$

Question 8 If $\lim_{x \rightarrow a} \frac{\sqrt{2x+1}-3}{x-4} = \frac{1}{3}$, then $a = \dots\dots\dots$

- A) 2 B) 4 C) 0 D) 9

Question 9 If a standard license plate consists of 3 letters followed by 3 digits, and repetition is allowed, how many such plates are possible?

- A) $26^3 + 10^3$ B) $26^3 \cdot 10^3$ C) $(26 + 10)^6$ D) $26 \cdot 25 \cdot 24 \cdot 10 \cdot 9 \cdot 8$

Question 10 The equation of the normal line to the function $f(x) = x^2 - 3$ at $x = 2$ is

- A) $y = -0.25x + 1.5$ B) $y = -0.25x + 0.5$ C) $y = 4x + 3$ D) $y = -4x + 3$

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

- A) $2 \tan(3x^2 + 2) \sec^2(3x^2 + 2)$ B) $12x \tan(3x^2 + 2)$
 C) $12x \tan(3x^2 + 2) \sec^2(3x^2 + 2)$ D) $2 \tan(3x^2 + 2) \sec^2(3x^2 + 2)$

Two forces are applied to a hook support, as shown in Figure 1. Knowing that the magnitude of $P = 35\text{ N}$, and the resultant of the two forces is to be in the horizontal axis,

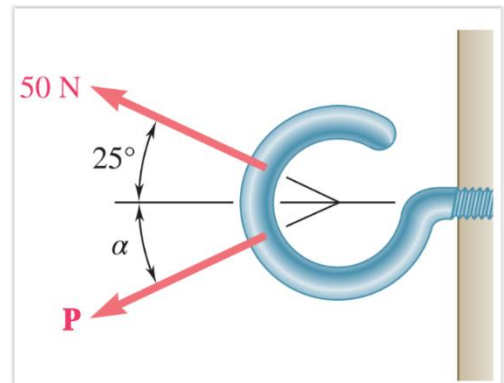


Figure 1

Question 12

The magnitude of the resultant force, F_R of these two forces is:

- A) $F_R = 0\text{ N}$
 B) $F_R = 35\text{ N}$
 C) $F_R = -35\text{ N}$
 D) $F_R = 73.2\text{ N}$

Question 13 If the force P is required to have a minimum value, the angle α will be:

- A) $\alpha = 37^\circ$
 B) $\alpha = 45^\circ$
 C) $\alpha = 60^\circ$

D) $\alpha = 90^\circ$

Question 14 The train starts from rest and has a velocity described by the graph, as shown in Figure 2. The total distance traveled during this time interval is:

- A) $s = 0m$
- B) $s = 620 m$
- C) $s = 920m$
- D) $s = 1020m$

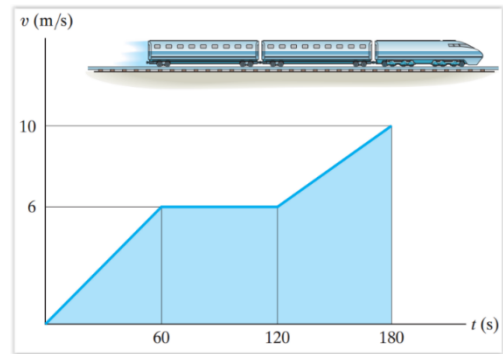


Figure 2

Question 15 A car of mass 1500 kg accelerates from rest to a speed of 20 m/s in 10 seconds on a horizontal road. Assuming no frictional losses, what is the net force acting on the car? Choose the closest answer:

- A) 1500 N
- B) 3000 N
- C) 2000 N
- D) 30000 N

Best Wishes for all