
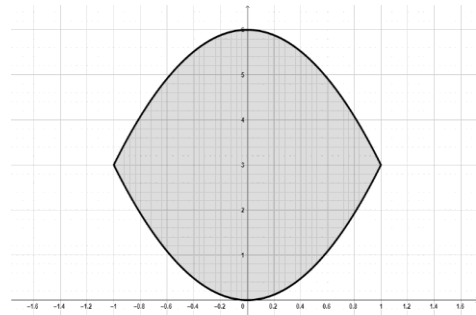


Egypt-Japan University of Science and Technology <i>Entrance Exam (Undergraduate)</i>		
Faculty of Engineering	Subject: Mathematics	 الجامعة المصرية للعلوم والتكنولوجيا E-JUST Egypt-Japan University of Science and Technology エジプト日本科学技術大学
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Student Name:	Student ID:	

Choose the correct answer

Question 1 Which of the following sets of functions represents the boundary of the region shown in the graph?



- A) $-3x^2, 3x^2 + 6$ B) $-3x^2, 3x^2 - 6$ C) $3x^2, -3x^2 + 6$ D) $3x^2, 3x^2 - 6$

Question 2 The graph of the quadratic function $f(x) = ax^2 + bx + a$ has no intersections with the x -axis if ...

- A) $0 < a < 2b$ B) $0 < b < 2a$ C) $-2b < a < 2b$ D) $-2a < b < 2a$

Question 3 Let $f(x) = 2x^3 - 9x^2 - 24x + 6, -2 \leq x \leq 7$. The maximum value of $f(x)$ occurs at $x =$

- A) 7 B) -2 C) 4 D) -1

Question 4 A car plate is divided into two parts. The first part consists of the letters A, B, C, D in any order, while the second part consists of the numbers 1, 2, 3, 4 in any order. How many different car plates are possible?

- A) 256 B) 492 C) 576 D) 1024

Question 5 Consider the following recurrence relation with $x_0 = 3$ and $x_1 = 4$:
 $(n + 1)x_n = 4(n + 1)(n + 3)x_{n-1} - 4(n + 2)(n + 3)x_{n-2}, \quad n \geq 2$
 The value of x_2 is ...

- A) 0 B) 1 C) 2 D) 3

Question 6 Let α and β be the two roots of the equation $x^2 - px + 1 = 0$. The value of $\alpha\beta$ equals:

- A) p B) 1 C) $-p$ D) -1

Question 7 Evaluate the following integration $\int (2x^2 + 7)e^x dx$

- A) $2e^x(x^2 - 2x + 2) + c$ B) $e^x(2x^2 - 4x + 11) + c$
C) $e^x(2x^2 - 4x + 4) + c$ D) $2e^x(2x^2 - 2x + 7) + c$

Question 8 Evaluate the following integration $\int \frac{x}{\sqrt{x-1}} dx$

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

Question 9 How many distinct arrangements can be made using all the letters in the word "APPLE"?

- A) 60 B) 120 C) 240 D) 720

Question 10 For $f(x) = (x - 6)^3$, find the value(s) of x where the slope of the tangent equals to 3.

- A) 1 and -1 B) 5 and 7 C) 6 D) -2

Question 11 If $y = \tan^2(3x^2 + 1)$, then $\frac{dy}{dx}$ equals to

- A) $2 \tan(3x^2 + 1) \sec^2(3x^2 + 1)$ B) $12x \tan(3x^2 + 1)$
C) $12x \tan(3x^2 + 1) \sec^2(3x^2 + 1)$ D) $6x \sec^2(3x^2 + 1)$

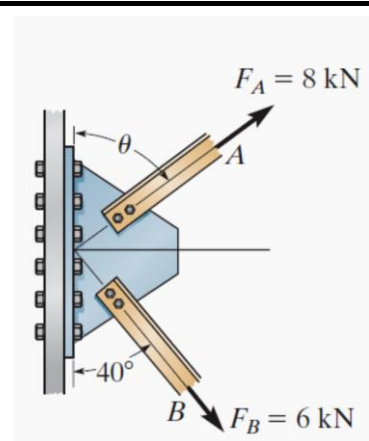
As shown in the Figure, the resultant force of F_A and F_B is directed horizontally to the right, then:

Question 12 The direction θ of the force F_A is

- A) 125°
B) 35°
C) 55°
D) 20°

Question 13 The magnitude of the resultant force

- A) 9.18 kN
B) 10.41 kN
C) 2.70 kN
D) 5.45 kN



A freight train travels at $v = 60(1 - e^{-t})$ m/sec where t is the elapsed time in seconds. Then:

Question 14 The distance traveled in three seconds is

- A) 20 m
B) 110 m

- C) 55 m
- D) 122 m

Question 15 The acceleration at this time is

- A) 1.43 m/sec²
- B) 2.99 m/sec²
- C) 10.35 m/sec²
- D) 60 m/sec²

Best Wishes for all