

GATE - 2018- CE

EE1030 : Matrix Theory
Indian Institute of Technology Hyderabad

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1 1 - 13

- 1) "The driver applied the _____ as soon as she approached the hotel where she wanted to take a _____."

The words that best fill the blanks in the above sentence are

- a) brake, break
- b) break, break
- c) brake, brake
- d) break, brake

- 2) "It is no surprise that every society has had codes of behaviour; however, the nature of these codes is often _____."

The word that best fills the blank in the above sentence is

- a) unpredictable
- b) simple
- c) expected
- d) strict

- 3) Hema's age is 5 years more than twice Hari's age. Suresh's age is 13 years less than 10 times Hari's age. If Suresh is 3 times as old as Hema, how old is Hema ?

- a) 14
- b) 17
- c) 18
- d) 19

- 4) Tower A is 90 m tall and tower B is 140 m tall. They are 100 m apart. A horizontal skywalk connects the floors at 70 m in both the towers. If a taut rope connects the top of tower A to the bottom of tower B, at what distance (in meters) from tower A will the rope intersect the skywalk?

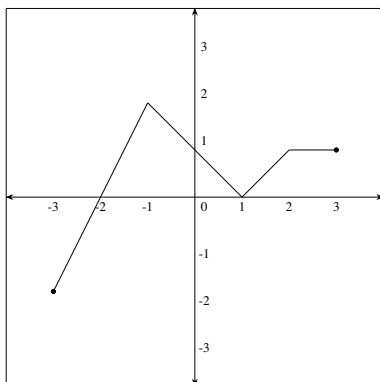
- a) 22.22
- b) 50

- c) 57.87
- d) 77.78

- 5) The temperature T in a room varies as a function of the outside temperature T_0 and the number of persons in the room p , according to the relation $T = K(\Theta p + T_0)$, where Θ and K are constants. What would be the value of Θ given the following data ?

T_0	p	T
25	2	32.4
30	5	42.0

- a) 0.8
 - b) 1.0
 - c) 2.0
 - d) 10.0
- 6) A fruit seller sold a basket of fruits at 12.5% loss. Had he sold it for Rs. 108 more, he would have made a 10% gain. What is the loss in Rupees incurred by the fruit seller?
- a) 48
 - b) 52
 - c) 60
 - d) 108
- 7) The price of a wire made of a superalloy material is proportional to the square of its length. The price of 10 m length of the wire is Rs. 1600. What would be the total price (in Rs.) of two wires of lengths 4 m and 6 m ?
- a) 768
 - b) 832
 - c) 1440
 - d) 1600
- 8) Which of the following function(s) is an accurate description of the graph for the range(s) indicated ?



(i) $y = 2x + 4$ for $-3 \leq x \leq -1$

(ii) $y = |x - 1|$ for $-1 \leq x \leq 2$

(iii) $y = ||x| - 1|$ for $-1 \leq x \leq 2$

(iv) $y = 1$ for $2 \leq x \leq 3$

- a) (i), (ii) and (iii) only.
- b) (i), (ii) and (iv) only.
- c) (i) and (iv) only.
- d) (ii) and (iv) only.

9) Consider a sequence of numbers $a_1, a_2, a_3, \dots, a_n$ where $a_n = \frac{1}{n} - \frac{1}{n+2}$, for each integer $n > 0$. What is the sum of the first 50 terms ?

- a) $\left(1 + \frac{1}{2}\right) - \frac{1}{50}$
- b) $\left(1 + \frac{1}{2}\right) + \frac{1}{50}$
- c) $\left(1 + \frac{1}{2}\right) - \left(\frac{1}{51} + \frac{1}{52}\right)$
- d) $1 - \left(\frac{1}{51} + \frac{1}{52}\right)$

10) Each of the letters arranged as below represents a unique integer from 1 to 9. The letters are positioned in the figure such that $(A \times B \times C)$, $(B \times G \times E)$ and $(D \times E \times F)$ are equal. Which integer among the following choices cannot be represented by the letters A, B, C, D, E, F or G ?

A		D
B	G	E
C		F

- a) 4
- b) 5
- c) 6
- d) 9

11) Which one of the following matrices is singular ?

- a) $\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$
- b) $\begin{bmatrix} 3 & 2 \\ 2 & 3 \end{bmatrix}$
- c) $\begin{bmatrix} 2 & 4 \\ 3 & 6 \end{bmatrix}$
- d) $\begin{bmatrix} 4 & 3 \\ 6 & 2 \end{bmatrix}$

12) For the given orthogonal matrix Q ,

$$Q = \begin{bmatrix} \frac{3}{7} & \frac{2}{7} & \frac{6}{7} \\ -\frac{6}{7} & \frac{3}{7} & \frac{2}{7} \\ \frac{2}{7} & \frac{6}{7} & -\frac{3}{7} \end{bmatrix}$$

The inverse is

- a) $\begin{bmatrix} \frac{3}{7} & \frac{2}{7} & \frac{6}{7} \\ -\frac{6}{7} & \frac{3}{7} & \frac{2}{7} \\ \frac{2}{7} & \frac{6}{7} & -\frac{3}{7} \end{bmatrix}$
- b) $\begin{bmatrix} -\frac{3}{7} & -\frac{2}{7} & -\frac{6}{7} \\ \frac{6}{7} & -\frac{3}{7} & -\frac{2}{7} \\ -\frac{2}{7} & -\frac{6}{7} & \frac{3}{7} \end{bmatrix}$
- c) $\begin{bmatrix} \frac{3}{7} & -\frac{6}{7} & \frac{2}{7} \\ \frac{2}{7} & \frac{3}{7} & \frac{6}{7} \\ \frac{6}{7} & \frac{2}{7} & -\frac{3}{7} \end{bmatrix}$
- d) $\begin{bmatrix} -\frac{3}{7} & \frac{6}{7} & -\frac{2}{7} \\ -\frac{2}{7} & -\frac{3}{7} & -\frac{6}{7} \\ -\frac{6}{7} & -\frac{2}{7} & \frac{3}{7} \end{bmatrix}$

13) At the point $x = 0$, the function $f(x) = x^3$ has

- a) local maximum
- b) local minimum
- c) both local maximum and minimum
- d) neither local maximum nor local minimum