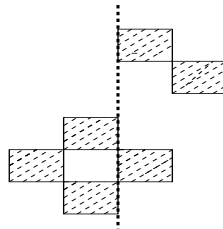


2021-ST-1-13

AI24BTECH11023 - Tarun Reddy Pakala

- 1) The current population of a city is 11,02,500. If it has been increasing at the rate of 5% per annum, what was its population 2 years ago ?
 - a) 9,92,500
 - b) 9,95,006
 - c) 10,00,000
 - d) 12,51,506
- 2) p and q are positive integers and $\frac{p}{q} + \frac{q}{p} = 3$, then, $\frac{p^2}{q^2} + \frac{q^2}{p^2} =$
 - a) 3
 - b) 7
 - c) 9
 - d) 11
- 3) The least number of squares that must be added so that the line P-Q becomes the lines of symmetry is _____.



- a) 4
b) 3
c) 6
d) 7
- 4) *Nostalgia* is to *anticipation* as _____ is to _____
Which one of the following options maintains a similar logical relation in the above sentence?
- a) Present, past
b) Future, past
c) Past, future
d) Future, present
- 5) Consider the following sentences:
(i) I woke up from sleep.
(ii) I woked up from sleep.
(iii) I was woken up from sleep.
(iv) I was wokened up from sleep.
Which of the above sentences are grammatically CORRECT?
- a) (i) and (ii)
b) (i) and (iii)
c) (ii) and (iii)
d) (i) and (iv)

Q.6-Q.10 Multiple Choice Questions (MCQ), carry two marks each (for each wrong answer: $-\frac{2}{3}$)

- 6) Given below are two statements and two conclusions.

Statement 1: All purple are green.

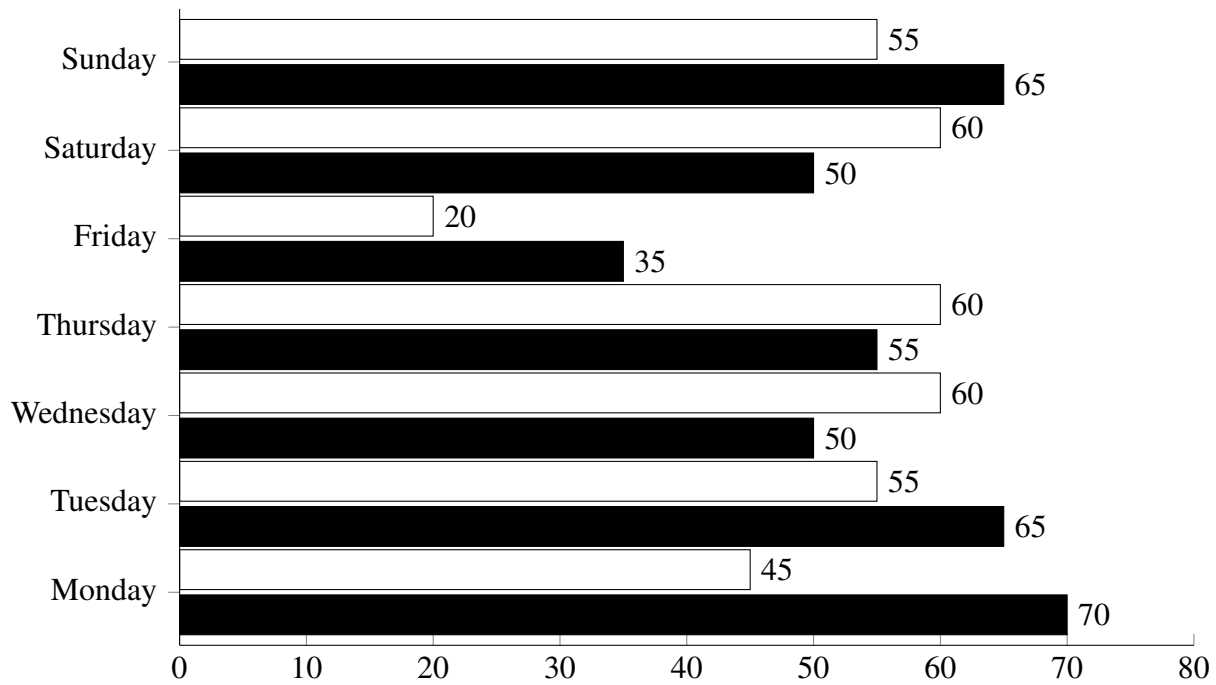
Statement 2: All black are green.

Conclusion I: Some black are purple.

Conclusion II: No black is purple.

Based on the above statements and conclusions, which one of the following options are logically CORRECT?

- Only conclusion I is correct.
 - Only conclusion II is correct.
 - Either conclusion I or II is correct.
 - Both conclusion I and II are correct.
- 7) Computers are ubiquitous. They are used to improve efficiency in almost all fields from agriculture to space exploration. Artificial intelligence (AI) is currently a hot topic. AI enables computers to learn, give enough training data. For humans, sitting in front of computer for long hours can lead to health issues.
- Which of the following can be deduced from the above passage?
- Nowadays, computers are present in almost all places.
 - Computers cannot be used for solving problems in engineering.
 - For humans, there are both positive and negative effects of using computers.
 - Artificial intelligence can be done without the data.
- (ii) and (iii)
 - (ii) and (iv)
 - (i), (iii) and (iv)
 - (i) and (iii)
- 8) Consider a square sheet of side 1 unit. In the first step, it is cut along the main diagonal to get two triangles. In the next step, one of the cut triangles is revolved about its short edge to form a solid cone. The volume of the resulting cone, in cubic units, is _____.
- $\frac{\pi}{3}$
 - $\frac{2\pi}{3}$
 - $\frac{3\pi}{2}$
 - 3π



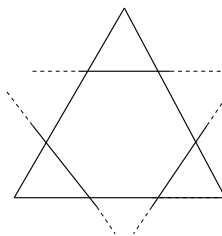
9)

The number of minutes spent by two students, **X** and **Y**, exercising every day in a given week are shown in the bar chart above.

The number of days in the given week in which one of the students spent a minimum 10% more than the other student, on a given day, is

- a) 4
- b) 5
- c) 6
- d) 7

10) Corners are cut from an equilateral triangle to produce a regular convex hexagon as shown in the figure above.



The ratio of the area of the regular convex hexagon to the area of the original equilateral triangle is

- a) 2 : 3
- b) 3 : 4
- c) 4 : 5
- d) 5 : 6

11) Let X be a non-constant positive random variable such that $E(X) = 9$. Then which one of the following statements is true?

- a) $E\left(\frac{1}{X+1}\right) > 0.1$ and $P(X \geq 10) \leq 0.9$
- b) $E\left(\frac{1}{X+1}\right) < 0.1$ and $P(X \geq 10) \leq 0.9$

c) $E\left(\frac{1}{X+1}\right) > 0.1$ and $P(X \geq 10) > 0.9$

d) $E\left(\frac{1}{X+1}\right) < 0.1$ and $P(X \geq 10) > 0.9$

12) Let $\{W(t)\}_{t \geq 0}$ be a standard Brownian motion. Then the variance of $W(1)W(2)$ equals

a) 1

b) 2

c) 3

d) 4

13) Let X_1, X_2, \dots, X_n be a random sample of size $n(\geq 2)$ from a distribution having the probability density function

$$f(x, \theta) = \begin{cases} \frac{1}{\theta} e^{-\frac{x-\theta}{\theta}}, & x > \theta \\ 0, & \text{otherwise} \end{cases}$$

where $\theta \in (0, \infty)$. Then the method of moments estimator of θ equals

a) $\frac{1}{2n} \sum_{i=1}^n X_i$

b) $\frac{2}{n} \sum_{i=1}^n X_i$

c) $\frac{1}{n} \sum_{i=1}^n X_i$

d) $\frac{n}{\sum_{i=1}^n X_i}$