Q.1 Let X be a non-negative integer valued random variable having probability mass function:

$$f(x) = \begin{cases} 0.25u(x) + 0.75\dfrac{\exp(-6)6^x}{x!} & x = 0, 1, 2, 3, \ldots \\ 0 & \text{otherwise,} \end{cases}$$

$$\text{where } u(x) = \begin{cases} 1 & x = 2 \\ 0 & \text{otherwise.} \end{cases}$$

Then, which of the following statement(s) is(are) true?

Max. score: 1; Neg. score: 0; Your score: 1

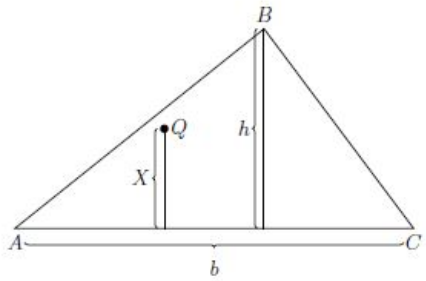
- ✔ ■ $\mathbb{E}(X) \leq 5$
- ☐ $\mathbb{E}(X) > 5$
- ☐ $Var(X) > 8$
- ✔ ■ $Var(X) \leq 8$

Q.2 A point Q is chosen at random along a rod of length l. The rod is bent at Q to form a right-angled triangle. If θ is the smallest angle, then choose the correct option(s):

Max. score: 1; Neg. score: 0; Your score: 0

- ■ $\mathbb{E}(\tan(\theta)) = 0.38$, rounded upto two decimal places
- ☐ $\mathbb{E}(\cot(\theta))$ exists
- ✔ ■ $\mathbb{E}(\sec^2(\theta))$ exists
- ✔ ■ $\mathbb{E}(\tan(\theta))$ exists

Q.3 A point Q is picked at random from a triangle with height h and with base of length b. Let X be the perpendicular distance from Q to the base, then calculate $100 \times P[X \leq 0.7h]$.



Max. score: 1.5; Neg. score: 0; Your score: 1.5

Your answer:

91

Correct answer:

91

Q.4 In the box of a product, there is a coupon with a number from the set $\{1, 2, 3, 4, 5, 6, 7\}$. A person gets a free box if s/he succeeds in getting all numbers of this set. Let N be the number of boxes that one needs to buy before getting a free box. Then, find $20 \times \mathbb{E}(N)$.

Max. score: 1.5; Neg. score: 0; Your score: 0

Your answer:

3

Correct answer:

363