Q.1 Let $X \sim Binomial(3, \frac{1}{4})$. Define $Y = \frac{X}{1+X}$. Which of the following statement(s) is(are) true?

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

- ☐ $\mathbb{E}(Y) > 0.42$
- ✔ ☑ $\mathbb{E}(Y) \leq 0.42$
- ✔ ☑ $Var(Y) \leq 0.09$
- ☐ $Var(Y) > 0.09$

Q.2 Let X be a random variable taking values in the interval $[1, 5]$. Then, which of the following statement(s) is(are) always correct?

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

- ☐ $Var(X) \leq 8/3$
- ✔ ☑ $Var(X) \leq 4$
- ☑ $Var(X) \leq 16/5$
- ☐ $Var(X) \leq 2$

Q.3 Suppose we are given three events A, B and C such that:

(i) A and B are independent,
(ii) B and C are independent.

Then, choose the correct option(s) from below:

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

- ✔ ☑ A, B and C may not be independent
- ☐ A, B and C are always independent
- ✔ ☑ B and $A \cap C$ may not be independent
- ☐ B and $A \cap C$ are always independent

Q.4 Let $X \sim N(5, 18)$. Define $Y = \exp(X)$ and

$$h(y) = \int_0^y \frac{1}{u} \exp\left(- \frac{(\ln u - 5)^2}{36} \right) du.$$

Find $30 \times P[h(Y) \leq \sqrt{\pi}]$.

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

Your answer:

1

Correct answer:

5