

Started on	Wednesday, 17 April 2024, 3:29 PM
State	Finished
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Time taken	44 mins 30 secs
Grade	16.00 out of 20.00 (80%)

Question 1

Complete

Mark 2.00 out of 2.00

The MGF of a random variable X is $\left(\frac{2}{3} + \frac{1}{3}e^t\right)^9$. What is variance of X ?

- ☐ a. None of these
- ☐ b. 3
- ☐ c. 1
- ☒ d. 2

The correct answer is: 2

Question 2

Complete

Mark 2.00 out of 2.00

Let X be a continuous random variable with PDF given by

$$f_X(x) = \frac{1}{2}e^{-|x|}, \quad \text{for } -\infty < x < \infty$$

If $Y = X^2$, find $P(Y \leq 1)$.

- ☐ a. 0.71
- ☐ b. 0.31
- ☐ c. None of the above
- ☒ d. 0.63

The correct answer is: 0.63



Question 3

Complete

Mark 2.00 out of 2.00

Suppose that the random variable X is uniformly distributed on $(0,1)$. Assume that the conditional distribution $Y | X = x$ has a binomial distribution with parameters n and $p = x$. Find $E(Y)$.

- ☐ a. $n/3$
- ☒ b. $n/2$
- ☐ c. $2n$
- ☐ d. n

The correct answer is: $n/2$

Question 4

Complete

Mark 2.00 out of 2.00

In a Poisson frequency distribution, frequency corresponding to 3 successes is $2/3$ times frequency corresponding to 4 successes. Find the mean of the distribution.

- ☒ a. 6
- ☐ b. None of these
- ☐ c. 2
- ☐ d. 3

The correct answer is: 6

Question 5

Complete

Mark 2.00 out of 2.00

Ten coins are thrown simultaneously. Find the probability of getting at least seven heads.

- ☐ a. 0.21
- ☐ b. 0.15
- ☐ c. 0.32
- ☒ d. 0.17

The correct answer is: 0.17



Question 6

Complete

Mark 2.00 out of 2.00

Suppose the temperature T during June is normally distributed with mean 68° and standard deviation 6° . Find the probability that the temperature is between 70° and 80° .

- ☐ a. 0.13
- ☒ b. 0.34
- ☐ c. 0.31
- ☐ d. 0.47

The correct answer is: 0.34

Question 7

Complete

Mark 2.00 out of 2.00

Consider a random variable X with its moment generating function

$$M_X(t) = (1/7)e^{2t} + (3/7)e^{3t} + (2/7)e^{5t} + (1/7)e^{8t}.$$

Then expectation $E(X^2)$ is equal to ...

- ☐ a. 15.2
- ☒ b. 20.71
- ☐ c. 9.67
- ☐ d. None of the above

The correct answer is: 20.71



Question 8

Complete

Mark 0.00 out of 2.00

Consider the probability density function (PDF) of a random variable X as $f_X(x) = \frac{1}{\pi(1+x^2)}$, $-\infty < x < \infty$. For this PDF

- ☒ a. Mean always exists.
- ☐ b. Both median and first quartile do not exist.
- ☐ c. First quartile exists.
- ☐ d. Median exists but first quartile does not exist.

The correct answer is:

First quartile exists.

Question 9

Complete

Mark 2.00 out of 2.00

The time one has to wait for a bus at a downtown bus stop is observed to be a random phenomenon X with the following probability density function:

$$\begin{aligned}
 f_X(x) &= 0, & \text{for } x < 0 \\
 &= \frac{1}{9}(x+1), & \text{for } 0 \leq x < 1 \\
 &= \frac{4}{9}\left(x - \frac{1}{2}\right), & \text{for } 1 \leq x \leq \frac{3}{2} \\
 &= \frac{4}{9}\left(\frac{5}{2} - x\right), & \text{for } \frac{3}{2} \leq x < 2 \\
 &= \frac{1}{9}(4-x), & \text{for } 2 \leq x < 3 \\
 &= \frac{1}{9}, & \text{for } 3 \leq x < 6 \\
 &= 0, & \text{for } x \geq 6.
 \end{aligned}$$

Let the events **A** and **B** be defined as follows:

A: One waits between 0 to 2 minutes inclusive, and B: One waits between 0 to 3 minutes inclusive. Find $P(B | A)$?

- ☐ a. 1/3
- ☐ b. 1/6
- ☐ c. 1/2
- ☒ d. 2/3

The correct answer is: 2/3



Question 10

Complete

Mark 0.00 out of 2.00

Let X be a continuous random variable with PDF $f_X(x) = \begin{cases} x^2 (2x + \frac{3}{2}), & 0 < x \leq 1 \\ 0, & \text{otherwise} \end{cases}$.

If $Y = \frac{2}{X} + 3$, find $\text{Var}(Y)$.

- ☐ a. $71/144$
- ☐ b. $2/5$
- ☒ c. $3/4$
- ☐ d. $17/12$

The correct answer is: $71/144$

