



Based on extensive testing, it is determined by the manufacturer of a washing machine that the time  $X$  (in years) before a major repair is required is characterized by the probability density function

$$f(x) = \begin{cases} 0.25e^{-Kx} & x \geq 0; \\ 0 & \text{otherwise.} \end{cases}$$

1. Determine the value of the constant  $K$ .
2. What is the probability that a major repair occurs in the first year?

$f(x) = \begin{cases} 0.25e^{-Kx} & x \geq 0 \\ 0 & \text{o.w.} \end{cases}$

①  $K = ?$

$\int_{-\infty}^{\infty} f(x) dx = 1$

$\int_{-\infty}^0 0 dx + \int_0^{\infty} 0.25 e^{-Kx} dx = 1$

$= \left[ \frac{e^{-Kx}}{-K} \right]_0^{\infty} = 1 \Rightarrow [e^{-\infty} - e^0] = -4K$

$(0 - 1) = -4K \Rightarrow K = \frac{1}{4}$

② In the first year  $\Rightarrow F_x(1)$

$= F_x(1) = P(X \leq 1) = \int_0^1 f(x) dx$

$= \int_0^1 0.25 e^{-\frac{x}{4}} dx = 0.25 \left[ -4 e^{-\frac{x}{4}} \right]_0^1$

$= -[e^{-\frac{1}{4}} - e^0] = 1 - e^{-\frac{1}{4}} = 1 - 0.778801$

$F_x(1) = 0.2211992$

**Question 1**

Correct

Mark 5.00 out of 5.00

🚩 Flag question

Let  $f_X(x)$  be the probability density function of the random variable X.

$$f(x) = \begin{cases} \frac{3}{(4)^3 - (-3)^3} x^2, & -3 \leq x \leq 4; \\ 0, & \text{otherwise.} \end{cases}$$

Determine  $F_X(-0.8)$

Answer:

 ✓

The correct answer is: 0.29108

**Question 2**

Correct

Mark 5.00 out of 5.00

🚩 Flag question

Let  $f_X(x)$  be the probability density function of the random variable X.

$$f(x) = \begin{cases} (2/10^2) x, & 0 \leq x \leq 10; \\ 0, & \text{otherwise.} \end{cases}$$

Find the mean of X.

Answer:

 ✓

The correct answer is: 6.66667

**Question 3**

Correct

Mark 5.00 out of 5.00

🚩 Flag question

Let  $f_X(x)$  be the probability density function of the random variable X.

$$f(x) = \begin{cases} (2/10^2) x, & 0 \leq x \leq 10; \\ 0, & \text{otherwise.} \end{cases}$$

Find the variance of X.

Answer:

 ✓

The correct answer is: 5.55556

**Question 1**

Correct


Mark 5.00 out of 5.00

Flag question

Let  $X$  be a random variable with a uniform distribution over the interval  $[-4, 4]$ .

Determine the variance of  $X$ .

Answer:

5.33333 

The correct answer is: 5.333333

**Question 2**


Incorrect

Mark 0.00 out of 5.00

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The number of cars that arrive at a certain intersection follows the Poisson distribution with a rate of 0.6 cars/min. What is the probability that at least two cars arrive in a 2.6 minutes period?

Answer:

0.32957 

The correct answer is: 0.462052

**Question 3**

Correct

Mark 5.00 out of 5.00

Flag question

Let  $X$  be a random variable that follows the normal distribution with a mean of 1.4 and a standard deviation of 3. Compute  $E\{x^2\}$ .

Answer:

10.96 

The correct answer is: 10.960000

**Question 4**


Correct

Mark 5.00 out of 5.00

Flag question

The lifetime  $X$  of a certain electronic component is an exponential random variable with a mean of 2 hours. Assuming 3 of these components operate independently in a device. The device operates if all components operate. Find the probability that the device operates for at least 2 hours.

Answer:

0.04979 

The correct answer is: 0.049787

**Question 5**


Incorrect

Mark 0.00 out of 5.00

Flag question

A multiple-choice exam contains 59 questions, each with 4 options (one is the correct answer). Assume that a student, who did not study well on the exam, decided to just guess on each answer. To pass the exam, a student must answer at least 22 questions correctly. Use the normal approximation to find the probability that a student will pass the exam?

Answer:

0.01215 

The correct answer is: 0.014682