

Computation Modeling Assignment 30

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Problem 30-1 Solutions

(a[a])

$$\begin{aligned}P(T \leq 1) &= \frac{1}{16} \\ &= 0.0625\end{aligned}$$

(a[b])

$$\begin{aligned}P(T > 2) &= 1 - P(T \leq 2) \\ &= 1 - \frac{4}{16} \\ &= 0.75\end{aligned}$$

(a[c])

$$\begin{aligned}P(1 \leq T \leq 3) &= P(T \leq 3) - P(T \leq 1) \\ &= \frac{9}{16} - \frac{1}{16} \\ &= 0.5\end{aligned}$$

(b)

$$\begin{aligned}P(2 < X \leq 3) &= \frac{e^{-\frac{2}{5}} - e^{-\frac{3}{5}}}{e^{-\frac{2}{5}}} \\ &= 0.1813\end{aligned}$$

(c[a])

$$\begin{aligned}\sum_{k=1}^{\infty} \frac{c}{3^k} &= 1 \\ c \cdot \left(\frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \frac{1}{81} + \dots \right) &= 1 \\ c \cdot \frac{\frac{1}{3}}{1 - \frac{1}{3}} &= 1 \\ c \cdot \frac{1}{2} &= 1 \\ c &= 2\end{aligned}$$

(c[b])

$$\begin{aligned}P(2, 4, 6) &= P(2) + P(4) + P(6) \\ &= \frac{2}{9} + \frac{2}{81} + \frac{2}{729} \\ &= 0.2497\end{aligned}$$

(c[c])

$$\begin{aligned}P(3, 4, 5, \dots) &= \sum_{k=3}^{\infty} \frac{2}{3^k} \\ &= \frac{\frac{2}{27}}{1 - \frac{1}{3}} \\ &= 0.1111\end{aligned}$$