Student Information

Name :Burak Bahar

ID : 2380137

Answer 1

a)If we are talking about uniform distribution then pdf = f(x) =

$$f(x) \begin{cases} \frac{1}{120} & 60 \leq x \leq 180 \\ 0 & x < 60 \vee x > 120 \end{cases}$$

1/120 comes from $1/(180 - 60)$

b) Mean value $= F(x) = \frac{180+60}{2} = 120$

$$Var(x) = \frac{(180-60)^2}{12} = 1200$$

$$Std(x) = \sqrt{Var(x)} = 34.641$$

c) Since probability uniformly distributed
$P(90 \leq x \leq 120) = \frac{120-90}{120} = \frac{30}{120} = 0.25$

d) $P(x \geq 150 | x \geq 120) = P(x \geq 150 \wedge x \geq 120)/P(x \geq 120)$
$= (30/120)/(60/120) = (1/4)/(1/2) = 1/2 = 0.5$

Answer 2

a) $Binomial(n,p) \approx Normal(\mu = np, \sigma = \sqrt{np(1-p)})$, μ **is mean and** σ
**is standard deviation. In a random sampling sample should support
the population. So n = 500 and p = 0.02** $\mu = 500 * 0.02 = 10$, **and**
$\sigma = \sqrt{10 * 0.98} = 3.130$

b) We will use continuity correction $P(X < 8) = P(X < 7.5) =$
$P(\frac{X-10}{3.130} < \frac{7.5-10}{3.130}) = \Phi(-0.79) = 0.2148$ **(from table A4)**

c) We will use the same method that is used in b. But since we will get the cumulative probability up to there being 15 supporters we need to subtract the answer from 1. 15.5 comes from continuity correction.
$P(X > 15.5) = P(\frac{X-10}{3.130} > \frac{15.5-10}{3.130}) =$
$1 - \Phi(1.75) = 1 - 0.959 = 0.041$ (from table A4)

d) W will again do the same thing. 6.5 and 14.5 came from continuity correction.
$P(6.5 < X < 14.5) = P(-3.5/3.130 < (X-10)/3.130 < 4.5/3.130) = \Phi(1.44) - \Phi(-1.12) = 0.9251 - 0.1314$ (from table A4)

Answer 3

a) this is an exponential distribution, so $f(x) = \lambda e^{-\lambda x}$ $\lambda = 1$ so since exponential distribution is continuous we can write $\int_0^1 \lambda e^{-\lambda x}\, dx =$
$-(e^{-1} - 1) = -(1 - e)/e = 0.6321$

b) Since exponential distribution has the property of being memoryless, it doesn't matter when the last lightning fell, so the answer is the as the last question's $= 0.6321$