

CDAG530, lecture #5

X : # of days a bulb lasts

Note Title

$$X \sim N(300, 50^2) \quad \mu=300, \quad \sigma=50$$

9/3/2013

Q1: $P(X \leq 365)$ define r.v. $Z = \frac{X-300}{50} \sim N(0,1)$

$$= P(50Z + 300 \leq 365) = P(Z \leq \frac{65}{50})$$

$$= P(Z \leq 1.3) = 0.903 \rightarrow \text{fail within 1 year} = 90.3\%$$

$$P(X=k+n, X \geq n) = P(X=k+n)$$

$$P(X > n) = P(\text{first } n \text{ trials all failed}) = (1-p)^n$$



$$P(A \cap B) = P(A) \text{ when } A \subseteq B$$

$$P(X \geq n) = P(\text{first } n-1 \text{ trials failed}) = (1-p)^{n-1}$$

$$P(X > n) = \sum_{k=n+1}^{\infty} P(X \geq k) = \sum_{k=n+1}^{\infty} (1-p)^{k-1} \cdot p = (1-p)^n$$

$$\begin{aligned}\text{Var}(X) &= E[(X - E[X])^2] = E[X^2 - 2X \cdot E[X] + E[X]^2] \\ &= E[X^2] - 2E[X] \cdot E[X] + E[X]^2 = E[X^2] - E[X]^2\end{aligned}$$

$$E[2] = 2$$

$$F_{X,Y}(x,y) \equiv P(X \leq x, Y \leq y) = P(X \leq x) \cdot P(Y \leq y)$$

$$\equiv F_X(x) \cdot F_Y(y)$$

$$\text{Cov}(X, X) = \text{Var}(X)$$

$$P(|X - \mu| < k) \geq \frac{\sigma^2}{k^2}$$