

HOMEWORK 9

JESSE COBB - 3PM SECTION (MON,WED)

1. a. $P(X < m) = P(X - 30 < m - 30) = .99$
 $P(X - 30 \geq m - 30) = .01$
 $P(X - 30 \geq m - 30) \leq \frac{2^2}{(m-30)^2} = .01$
 $(m - 30)^2 = 400 \implies m - 30 = 20 \implies m = 50$
 b. $P(X < m) = P(Z < \frac{m-(30)}{\frac{2}{10}}) = \Phi(\frac{m-(30)}{\frac{2}{10}}) = .99$
 $\frac{10m-300}{2} = 2.33 \implies 10m = 304.66 \implies m = 30.466$
2. $f_{X,Y}(x, y) = \begin{cases} \frac{\lambda}{y} \cdot e^{-\lambda y} & 0 < x < y < \infty \\ 0 & \text{otherwise} \end{cases}$
 a. $\int_0^\infty \int_0^y \frac{\lambda}{y} \cdot e^{-\lambda y} dx dy = \int_0^\infty \lambda \cdot e^{-\lambda y} dy = -e^{-\lambda y} \Big|_0^\infty = 1$
 b. $f_Y(y) = \int_0^y \frac{\lambda}{y} \cdot e^{-\lambda y} dx = \lambda \cdot e^{-\lambda y}$
 c. $f_{X|Y}(x|y) = \frac{\frac{\lambda}{y} \cdot e^{-\lambda y}}{\lambda e^{-\lambda y}} = \frac{1}{y}$
 d. $E[X] = \int_0^\infty E[X|Y] f_Y(y) dy = \int_0^\infty f_Y(y) \int_0^y x e^{-\lambda y} dx dy$
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