

Assignment 5

$$Q7. \begin{cases} \mu = 24 \\ \sigma^2 = 144 \end{cases} \Rightarrow \begin{cases} \alpha\beta = 24 \\ \alpha\beta^2 = 144 \end{cases} \Rightarrow \begin{cases} \alpha = 4 \\ \beta = 6 \end{cases}$$

$$X \sim \text{Gamma}(4, 6).$$

$$(a) P(12 \leq X \leq 24)$$

$$= F(24; 4, 6) - F(12; 4, 6)$$

$$= F(4; 4) - F(2; 4)$$

$$P(X \leq x) = F(x; \alpha, \beta) = F\left(\frac{x}{\beta}; \alpha\right)$$

\therefore Look at table A4

$$(b) P(X \leq 24) = F(4; 4) = 0.567$$



Median 24.

Median is less than Mean 24.

$$(c) F\left(\frac{x}{\beta}, \alpha\right) = F\left(\frac{x}{6}, 4\right) = 0.99$$

$$(d) \text{ We want a value } t \text{ for } P(X > t) = 0.005$$

$$\Rightarrow P(X \leq t) = 1 - P(X > t) = 0.995$$

$$\therefore F\left(\frac{t}{6}, 4\right) = 0.995$$

$$\Rightarrow \text{In table A4, } F(11; 4) = 0.995$$

$$\Rightarrow t = 11(6) = 66$$

Q3 Using Normal approximation to binomial distn.

$$X \sim \text{Bin}(1000, 0.03)$$

$$Y \sim N(np, np(1-p)) = N(30, 5.394^2)$$

(a) Using Continuity Correction,

$$P(X \geq 37) = 1 - P(X < 37)$$

$$= 1 - P(X \leq 36)$$

$$= 1 - P(Y \leq 36.5)$$

$$= 1 - P\left(Z \leq \frac{36.5 - 30}{5.394}\right)$$

(b) 6% of 1000 is 60,

$$P(X \leq 60) = P\left(Z \leq \frac{60.5 - 30}{5.394}\right)$$