Midterm Exam formulas

Stat 251

$$\bar{x} = \frac{\sum x_i}{n} = \frac{x_1 + x_2 + \cdots + x_n}{n}$$

$$s^2 = \frac{\sum (x_i - \bar{x})^2}{n-1} = \frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + \cdots + (x_n - \bar{x})^2}{n-1}$$

$$s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}} = \sqrt{s^2}$$

$$ER: \ 68\% : \bar{x} \pm 1s, \ 95\% : \bar{x} \pm 2s, \ 99.7\% : \bar{x} \pm 3s$$

$$P(A') = 1 - P(A)$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$EX = E(X) = \sum x \cdot p(x) = x_1 p(x_1) + x_2 p(x_2) + \cdots + x_n p(x_n)$$

$$VX = V(X) = \sum (x - EX)^2 \cdot p(x) = (x_1 - EX)^2 p(x_1) + (x_2 - EX)^2 p(x_2) + \cdots + (x_n - EX)^2 p(x_n)$$

$$SDX = SD(X) = \sqrt{V(X)} \Rightarrow (SDX)^2 = VX$$

$$X \sim B(n,p) : P(X = x) = \binom{n}{x} p^x q^{n-x} \ \textit{where } q = 1 - p \textit{ and } \binom{n}{x} = \frac{n!}{x!(n-x)!}$$

$$EX = np \ ; \ VX = npq \ ; \ SDX = \sqrt{npq}$$

$$X \sim P(\mu) : P(X = x) = \frac{\mu^x e^{-\mu}}{x!}$$

$$EX = \mu \ ; \ VX = \mu \ ; \ SDX = \sqrt{\mu}$$

$$X \sim N(\mu, \sigma) : \quad z = \frac{x - \mu}{\sigma}$$