Formulas For Exam 1

$$\overline{x} = \sum_{i=1}^{n} \frac{x_i}{n}$$

$$\mu = \sum_{i=1}^{N} \frac{x_i}{N}$$

$$MAD = \sum_{i=1}^{n} \frac{|x_i - \overline{x}|}{n}$$

$$s^2 = \sum_{i=1}^{n} \frac{(x_i - \overline{x})^2}{n-1}$$

$$\sigma^2 = \sum_{i=1}^{N} \frac{(x_i - \overline{x})^2}{N}$$

$$\sigma = \sqrt{\sigma^2}$$

$$CV = \left(\frac{s}{\overline{x}}\right) 100$$

$$z = \frac{x - \overline{x}}{s}$$

Tchebysheff's Theorem - At least $1 - \left(\frac{1}{k^2}\right)$ of the measures will lie within k s.d. of their mean

Counting

$$n^r$$

$$\frac{(n+r-1)!}{r!(n-1)!}$$

$$P_r^n = \frac{n!}{(n-r)!}$$

$$C_r^n = \frac{n!}{r!(n-r)!}$$

Probability

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

If A and B are mutually exclusive $P(A \cap B) = 0$

$$P(A) + P(\overline{A}) = 1$$

$$P(B|A) = \frac{P(A \cap B)}{P(A)}$$

$$P(A \cap B) = P(A)P(B|A) = P(B)P(A|B)$$

If A and B are independent $P(A|B) = P(A)$

Random Variables

$$\mu = E(x) = \sum_{i=1}^{n} xP(x)$$

$$\sigma^2 = \sum_{i=1}^{n} (x - \mu)^2 P(x)$$

Binomial Distribution

$$P(x) = C_x^n p^x q^n - x$$

$$\mu = np$$

$$\sigma^2 = npq$$

Poisson Distribution

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

$$mean = \mu = \sigma^2$$

Hypergeometric Distribution

$$P(x) = \frac{C_x^r C_{n-x}^{N-r}}{C_n^N}$$

$$\mu = n\left(\frac{r}{N}\right)$$

$$\sigma^2 = n\left(\frac{r}{N}\right)\left(\frac{N-n}{N}\right)\left(\frac{N-n}{N-1}\right)$$