# Formulas for Midterm Exam

Sample mean and variance:

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

probability:

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

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

# Formulas for Final Exam

$X$ : $Z = \frac{X - \mu}{\sigma}$ $S^2 = \frac{\sum (x_i - \bar{x})^2}{n-1}$

$\bar{X}$ : $Z = \frac{\bar{X} - \mu}{\sigma / \sqrt{n}}$ $Var(\bar{X}) = \frac{\sigma_x^2}{n}$ $SD(\bar{X}) = \frac{\sigma_x}{\sqrt{n}}$

$\hat{p}$ : $Z = \frac{\hat{p} - p}{\sqrt{p(1-p)/n}}$ $Var(\hat{p}) = \frac{p(1-p)}{n}$ $SD(\hat{p}) = \sqrt{\frac{p(1-p)}{n}}$

## Discrete Variable - X

$E(X) = \mu_x = \sum xP(x)$ $Var(X) = \sum (x_i - \mu)^2 P(X = x_i)$

## Confidence Intervals

*For* $\mu$ : $(\bar{x} - Z_{\alpha/2}\frac{\sigma}{\sqrt{n}}, \bar{x} + Z_{\alpha/2}\frac{\sigma}{\sqrt{n}})$ $(\bar{x} - t_{\alpha/2,\nu}\frac{s}{\sqrt{n}}, \bar{x} + t_{\alpha/2,\nu}\frac{s}{\sqrt{n}})$