

STA 291 - 420
Formulas for Exam 2

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

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

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

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

$$\bullet E(X) = \mu = \sum_i x_i \cdot P(X = x_i)$$

$$\bullet \text{Var}(X) = \sigma^2 = \sum_i (x_i - \mu)^2 \cdot P(X = x_i) \quad \text{OR} \quad \text{Var}(X) = E(X^2) - \mu^2$$

•Bernoulli distribution (parameter p)

$$P(X = 1) = p, P(X = 0) = 1 - p,$$

$$E(X) = p, \text{Var}(X) = p \cdot (1 - p)$$

•Binomial distribution (parameters n and p)

$$P(X = k) = \binom{n}{k} \cdot p^k \cdot (1-p)^{n-k} \text{ for } k = 0, 1, \dots, n, E(X) = n \cdot p, \text{Var}(X) = n \cdot p \cdot (1-p)$$

$$\bullet z = \frac{x - \mu}{\sigma} \qquad x = \mu + z \cdot \sigma$$

$$\bullet z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} \qquad \bar{x} = \mu + z \cdot \frac{\sigma}{\sqrt{n}}$$

$$\bullet \bar{X} \pm z \cdot \frac{\sigma}{\sqrt{n}} \qquad \hat{p} \pm z \cdot \sqrt{\frac{\hat{p} \cdot (1 - \hat{p})}{n}}$$

$$\bullet \bar{X} \pm t \cdot \frac{s}{\sqrt{n}}$$

$$\bullet n = \sigma^2 \cdot \frac{z^2}{B^2} \qquad n = \hat{p} \cdot (1 - \hat{p}) \cdot \frac{z^2}{B^2}$$

Confidence Level	90%	95%	99%
Confidence Coefficient, $z_{\alpha/2}$	1.645	1.96	2.575