Formulas For Exam 2

Binomial Distribution

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

$$\mu = np$$

$$\sigma^2 = npq$$

Normal Distribution

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

Transform to standard normal

$$z = \frac{x-\mu}{\sigma}$$

Uniform Distribution

$$f(x) = \frac{1}{b-a}$$

When $a < x < b$ and zero otherwise

$$\mu = \frac{1}{2}(a+b)$$

$$\sigma = \frac{(b-a)}{\sqrt{12}}$$

$$P(c < x < d) = \frac{d-c}{b-a}$$

Exponential Distribution

$$f(x) = \lambda e^{-\lambda x}$$

when $x \geq 0$ and zero otherwise

$$\mu = \frac{1}{\lambda}$$

$$\sigma = \frac{1}{\lambda}$$

$$P(x \geq a) = e^{-\lambda a}$$

Sampling Distribution of a Mean

$$\mu_{\overline{x}} = \mu$$

$$\sigma_{\overline{x}} = \frac{\sigma}{\sqrt{n}}$$

Sampling Distribution of a Proportion

$$\hat{p} = \frac{x}{n}$$

$$\mu_{\hat{p}} = p$$

$$\sigma_{\hat{p}} = \sqrt{\frac{pq}{n}}$$

Large Sample Interval Estimator

Two sided interval

point estimate$\pm z_{\alpha/2}\times$standard error

One sided interval

point estimate $\pm\ z_{\alpha} \times$ standard error

Small Sample Interval Estimator

Same as Large Sample, just replace z with t

Degrees of freedom = $n-1$ for sample means and $n_1 + n_2 - 2$ for differences in means

Standard Errors of Estimators

Mean large and small sample

$$s.e. = \frac{s}{\sqrt{n}}$$

Difference in mean large sample

$$s.e. = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

Difference in mean small sample

$$s.e. = s\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

Where

$$s^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{(n_1 - 1) + (n_2 - 1)}$$

Proportion

$$s.e. = \sqrt{\frac{\hat{p}\hat{q}}{n}}$$

Difference in Proportion

$$s.e. = \sqrt{\frac{\hat{p}_1\hat{q}_1}{n_1} + \frac{\hat{p}_2\hat{q}_2}{n_2}}$$

Choosing a Sample Size

$$z_{\alpha/2} \times \text{standard error} = D$$

Where standard errors are given as above and

$$4\sigma = R$$