Formulas for Exam # 2

Binomial distribution

$$P(x) = C^n_x \, p^x q^{n-x}$$

$$C^n_x = \frac{n!}{x!(n-x)!}$$

$$\mu = np$$

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

Poisson distribution

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

mean $= \mu$

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

Hyper geometric distribution

$$P(x) = \frac{C^r_x \, C^{N-r}_{n-x}}{C^N_n}$$

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

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

Normal distribution

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

mean $= \mu$

var $= \sigma^2$

- use standard Normal table (z)

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

uniform distribution

$$f(x) = \begin{cases} \frac{1}{b-a} & a < x < b \\ 0 & \text{otherwise} \end{cases}$$

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

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

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

exponential distribution

$$f(x) = \begin{cases} \lambda e^{-\lambda x} & \text{if } \lambda > 0,\ x > 0 \\ 0 & \text{otherwise} \end{cases}$$

$$\mu = 1/\lambda$$

$$\sigma = 1/\lambda$$

$$P(x \geq a) = e^{-\lambda a} \qquad a > 0 \ \ \lambda > 0$$

Central limit theorem

If random samples of n observations are drawn from a non normal population with finite mean μ and s.d. σ, then when $n \geq 25$ the sampling distribution of the sample mean ($\bar{x}$) is approximately normally distributed with mean and standard error

$$\mu_{\bar{x}} = \mu \qquad \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

the normal table will be given

- know when you can approx hyper as binomial

and binomial as normal and how to solve it