FORMULA SHEET for EXAM 4

- if $X \sim N(\mu, \sigma_x)$, then $\bar{X}_n \sim N\left(\mu, \frac{\sigma_x}{\sqrt{n}}\right)$
- if $X \sim bin(n,p)$, then $E(X) = np$ $V(X) = np(1-p)$ $\sigma_x = \sqrt{np(1-p)}$

  and if n large, X can be approximated by $N(\mu, \sqrt{np(1-p)})$
- $X \sim bin(n,p)$ then for large n $\hat{p}$ (sample proportion) has the probability distribution:

$$\hat{p} \sim N\left(p, \sqrt{\frac{p(1-p)}{n}}\right)$$

- $(1-\alpha)\%$ C.I. for μ: $\bar{X}_n \pm Z_{\frac{\alpha}{2}}\left(\frac{\sigma_x}{\sqrt{n}}\right)$ can use s_x for σ_x if $n \geq 30$
- $(1-\alpha)\%$ C.I. for p: $\hat{p} \pm Z_{\alpha/2}\sqrt{\frac{p(1-p)}{n}}$
- choosing sample size:
  - when estimating μ: E = maximum tolerable error $= Z_{\alpha/2}\frac{\sigma_x}{\sqrt{n}}$
  - when estimating p: E = " " " $= Z_{\alpha/2}\left(\sqrt{\frac{p(1-p)}{n}}\right)$
- small sample estimation for μ: $\bar{x}_n \pm t_{n-1,\alpha/2}\left(\frac{s_x}{\sqrt{n}}\right)$

TO ESTIMATE (TEST) POPULATION MEAN: