

Outline for Exam 2

- I. Is the problem binomial?
- A. Is the problem asking you to find a probability?
1. Can you use Table A-1 on page 769 - 771 or your calculator (binompdf)?
 2. Otherwise,

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

$$q = 1 - p$$
- B. Is the problem asking you for the mean (expected value) and/or standard deviation?
- $$\mu = n \cdot p$$
- $$\sigma = \sqrt{n \cdot p \cdot q}$$

- II. Is the problem asking you to construct a probability distribution? Is the problem binomial? If so, use the techniques for a binomial problem?

$$\mu = \sum [x \cdot P(x)]$$

$$\sigma = \sqrt{\sum [x^2 \cdot P(x)] - \mu^2}$$

- III. Does the problem say normally distributed?

- A. Is it asking you to find a probability?

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

Use Table A-2 page 772-773 or your calculator (normalcdf) to find the probability.

- B. Is it asking you to find a score that separates?

Use Table A-2 page 772-773 or your calculator (invNorm) to find the z-score based on the probability and your drawing.

$$\text{Solve for } x = z \cdot \sigma + \mu$$

- IV. Is the problem asking you to find the probability that the sample mean or average does something?

Could be normal.

$$Z = \frac{(\bar{x} - \mu_{\bar{x}})}{\left(\frac{\sigma}{\sqrt{n}}\right)}$$

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

Use Table A-2 on page 772-773 or your calculator (normalcdf) to find the probability.

- V. Is the problem asking you to construct a confidence interval?
 A. For the population mean, μ

$$\bar{x} - E < \mu < \bar{x} + E$$

$$E = Z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}, \sigma \text{ known} \quad Z\text{-interval}$$

$$E = t_{\alpha/2} \cdot \frac{s}{\sqrt{n}}, \sigma \text{ unknown} \quad t\text{-interval}$$

- B. For the population proportion, p

$$\hat{p} - E < p < \hat{p} + E \quad 1\text{-PropZ-interval}$$

$$E = Z_{\alpha/2} \cdot \sqrt{\frac{\hat{p} \cdot \hat{q}}{n}}$$

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

$$\hat{q} = 1 - \hat{p}$$

- VI. Is the problem asking you to find how many or find a sample size?
Always round up to the next integer.

- A. For the population mean, μ

$$n = \left(\frac{z_{\alpha/2} \cdot \sigma}{E} \right)^2$$

- B. For the population proportion, p

$$n = \frac{(z_{\alpha/2})^2 \cdot \hat{p} \cdot \hat{q}}{E^2}$$

$$\hat{p} = \frac{x}{n}, \hat{q} = 1 - \hat{p}$$

If \hat{p} is not given, assume $\hat{p} = .5$