EXAM 4 - SOLUTIONS

18 1. a) a statement about a population parameter
b) a function of the sample data
c) the set of all test statistic values for which Ho will be rejected.
d) rejecting Ho when Ho is true
e) fail to reject Ho when H_1 is true
f) the probability of a Type I error

16 2. 10 a) $\hat{p} \pm Z_{.025}\sigma_{\hat{p}} = \hat{p} \pm Z_{.025}\sqrt{\frac{p(1-p)}{n}}$

$= .15 \pm 1.96\sqrt{\frac{(.15)(.85)}{100}} = (.08, .22)$

$P(.08 \le p \le .22) = .95$

3 b) narrower 3 c) wider

16 3. $\bar{x} \pm t_{15-1,.01}\frac{s_x}{\sqrt{n}} = 72 \pm 2.624\left(\frac{7}{\sqrt{15}}\right) = 72 \pm 4.75$

$= (67.25, 76.75)$

$P(67.25 \le \mu \le 76.75) = .98$

16 4. $E = Z_{\alpha/2}\sqrt{\frac{p(1-p)}{n}}$ — use $p = .5$ when we don't have any idea what p is

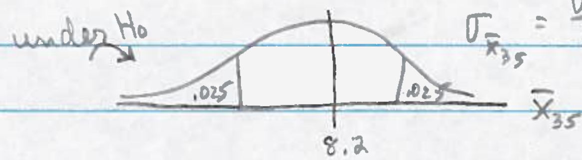
$.01 = Z_{.005}\sqrt{\frac{.5(1-.5)}{n}}$ or .995

$.01 = 2.57\sqrt{\frac{.5(1-.5)}{n}}$

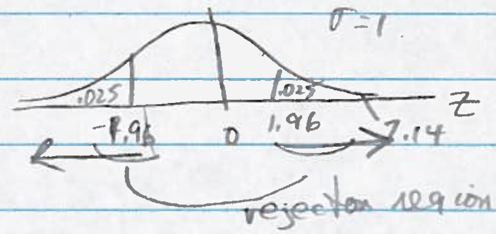
$\Rightarrow n = 16,513$ (or close to this if you used 2.58)

16 (5.) 8 a) $H_0: \mu = 8.2$

$H_1: \mu \neq 8.2$



$\sigma_{\bar{x}_{35}} = \frac{\sigma_x}{\sqrt{n}} \doteq \frac{s_x}{\sqrt{n}} = \frac{.025}{\sqrt{35}} \doteq .0042$



OUR $z_{sample} = \frac{8.23 - 8.2}{.0042}$

$= 7.14$

Our z_{sample} is in the rejection region, so the sample data seem to indicate that the mean has changed from 8.2. REJ H_0

5 b) $\bar{X} \pm z_{.025} \frac{s_x}{\sqrt{n}} = 8.23 \pm 1.96 \left(\frac{.025}{\sqrt{35}}\right)$

$= (8.222, 8.238)$

or $P(8.222 \le \mu \le 8.238) = .95$

3 c) If our H_0 mean of 8.2 is INSIDE the confidence interval then we accept H_0. If outside, we reject H_0

see bottom of page 97a in notes

16 (6) $E = z_{\frac{\alpha}{2}} \sqrt{\frac{p(1-p)}{n}}$

$.01 = z_{\alpha/2} \sqrt{\frac{.54(1-.54)}{1500}} \Rightarrow z_{\frac{\alpha}{2}} \doteq .777$

$\Rightarrow \alpha/2 \doteq .5 - .28 = .22$ — from z-table for $z = .777$

$\therefore \alpha \doteq .44 \Rightarrow$ a 56% CONFIDENCE INTERVAL