8.5 , 8.7 , 8.8

26 a) $H_0: \mu_1 = \mu_2$

$H_A: \mu_1 - \mu_2 > 0$

b) one tail test

c) $z_{.1\,crit} = 1.282$

d) you look like it

e) $z_{obs} = \dfrac{11.6 - 9.7}{\sqrt{\frac{274}{80} + \frac{380}{80}}} = 2.687$ $\quad z_{obs} > z_{crit}$ Reject H_0 evidence suggests $\mu_1 > \mu_2$

31 a) $H_0: \mu_1 - \mu_2 = 0$

$H_A: \mu_1 - \mu_2 \neq 0$

c) $z_{\alpha/2} = 2.576$

d) $z_{obs} = \dfrac{264 - 199}{\sqrt{\frac{157^2}{30} + \frac{111^2}{30}}} = 1.85$ $\quad z_{crit} < z_{obs}$

there is not enough evidence to suggest the mean returns of the firms are different

fail to Reject: H_0 - there [illegible]

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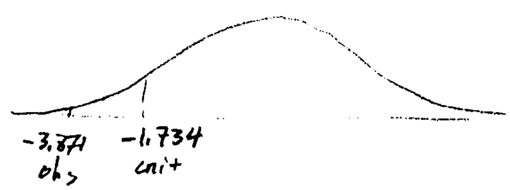
33. a-b) $H_0: \mu_1 - \mu_2 = 0$ $\quad H_A: \mu_1 - \mu_2 < 0$

c) $\alpha = .05$ on sided test $\quad$ d.f. $= 10 + 10 - 2 = 18$ $\quad t_{.05} = 1.734$ we will be interersted in -1.734

d) $s^2 = \dfrac{9(.95)^2 + 9(.56)^2}{18} = .66805$

$s = .7798$

$z_{obs} = \dfrac{6.82 - 8.17}{.7798\sqrt{\frac{1}{10} + \frac{1}{10}}} = -3.871$



$|z_{obs}| > |z_{crit}|$ Reject H_0

we can say with 95% confidence that the training program increased customer service scores

e) there is a 5% chance we are wrong

55 a) $H_0: p_1 = p_2$
$H_A: p_1 \neq p_2$

b) two-tail test

c) $\hat{p}_1 = \frac{74}{140} = .53$ $\hat{p}_2 = \frac{81}{140} = .58$ pooled $\hat{p} = \frac{74+81}{280} = .55$

$z_{obs} = \frac{.53 - .58}{\sqrt{(.55)(.45)\left(\frac{2}{140}\right)}} = -.84$ $z_{crit} = -1.645$ Fail to Reject H_0

56 a) $H_0: p_1 = p_2$
$H_A: p_1 < p_2$

b) one tail test   c) $z_{obs} = -.84$ $\alpha = .01$ $z_{crit} = -1.28$

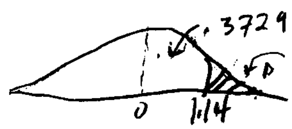
Fail to Reject H_0

59 a) $H_0: p_{93} = p_{92}$
$H_A: p_{93} > p_{92}$

$\hat{p} = \frac{200+180}{2000} = .19$ $z_{obs} = \frac{.2 - .18}{\sqrt{(.19)(.81)\left(\frac{1}{2000}\right)}} = 1.14$

$\alpha = .05$ $z_{crit} = 1.645$ $z_{obs} < z_{crit}$ fail to Reject H_0

b) $z_{obs} = 1.14$



$.5 - .3729 = .1271$
even at a $\alpha = .1$ we would have failed to reject H_0

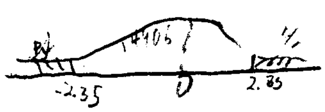
$20+20-2=38$

126 a) $H_0: \mu_1 = \mu_2$
$H_A: \mu_1 \neq \mu_2$

$z_{obs} = \frac{43.1 - 44.6}{\sqrt{\frac{4.28}{20} + \frac{3.89}{20}}} = -2.35$

$\alpha = .05$ $z_{crit} = -1.96$ $z_{obs} < z_{crit}$ Reject H_0

b) $z_{obs} = -2.35$



pvalue = .0188

$2(.5 - .4906)$

93 a) $H_0: \mu_1 - \mu_2 = 0$

$H_A: \mu_1 - \mu_2 \neq 0$

$d.f. = 10 + 10 - 2 = 18 \qquad t_{crit} = t_{\alpha/2} = t_{.05} = 1.734$

we are interested in -1.734

$$s^2 = \frac{9(16.36) + 9(18.92)}{18} = 17.64$$

$s = 4.2$

$$t_{obs} = \frac{22.2 - 28.5}{4.2\sqrt{\frac{1}{10} + \frac{1}{10}}} = -3.354$$

$|t_{obs}| > |t_{crit}|$ Reject H_0

statistically there is a difference between mean service time between employees

b)

p-value, $t_{obs} = 3.354$ → larger than any value on t-table at 18 d.f

so you know p value less than $.005 \times 2$

p-value $< .01$

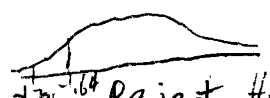
48 $\hat{p} = \frac{1238}{2000} = .619$ a) $H_0: p = .6$; $H_A: p > .6$ b) one tail test

c) $z_{obs} = \frac{.619 - .6}{\sqrt{\frac{(.6)(.4)}{2000}}} = 1.734$ $\alpha = .05$ $z_{crit} = 1.645$ $z_{obs} > z_{crit}$ Reject H_0

we can conclude statisfactorily that $p > .6$

54 $\hat{p} = \frac{108}{200} = .54$ a) $H_0: p = .6$; $H_A: p < .6$

b) $z_{obs} = \frac{.54 - .6}{\sqrt{\frac{(.6)(.4)}{200}}} = -1.732$ $\alpha = .05$ $z_{crit} = -1.645$



Reject H_0

there is evedince of a reduction

c) $.54 \pm 1.96\sqrt{\frac{(.54)(.46)}{200}} = .54 \pm .069$ $.471 < p < .609$

d) $1.96\sqrt{\frac{(.54)(.46)}{n}} \leq .01$ $\sqrt{n} \geq 96.02$ $n \geq 9220$