S12 - 3.12 - Two Prop's/Before/After Notes

Defective lap-tops; two companies. 95% CL.

$n_1 = 800, x_1 = 32$
$n_2 = 500, x_2 = 30$

$H_O : p_1 = p_2$
$H_a : p_1 \neq p_2$

$p_1 - p_2 = 0$

$\hat{p}_1 = \frac{x_1}{n_1} = \frac{32}{800} = 0.04$ $\hat{p}_2 = \frac{x_2}{n_2} = \frac{30}{500} = 0.06$

$\hat{p} = \frac{x_1 + x_2}{n_1 + n_2} = \frac{32 + 30}{800 + 500}$

$\hat{p} = 0.04769$

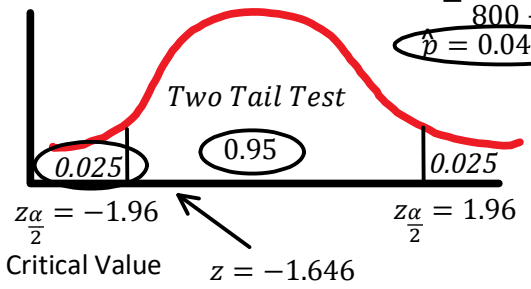
$\alpha = 0.05$

$\frac{\alpha}{2} = 0.025$

$$z = \frac{(\hat{p}_1 - \hat{p}_2) - (p_1 - p_2)}{\sqrt{\hat{p}(1-\hat{p})(\frac{1}{n_1} + \frac{1}{n_2})}}$$

$$z = \frac{(0.04 - 0.06) - (p_1 - p_1)}{\sqrt{0.04769(1 - 0.04769)(\frac{1}{800} + \frac{1}{500})}}$$

$$z = \frac{-0.02}{0.012149} = -1.646$$



Fail to reject H_0. There is not a significant difference between the proportions of the two groups.

$x_d = W_A - W_B$

Weights	*Before*	*After*	x_d	$(x_d - \overline{x_d})$	$(x_d - \bar{x})^2$
1	185	169	−16	−2.9	8.41
2	192	187	−5	8.1	65.61
3	206	193	−13	0.1	0.01
4	177	176	−1	12.1	146.41
5	225	194	−31	−17.9	320.41
6	168	171	3	16.1	259.21
7	256	228	−28	−14.9	222.01
8	239	217	−22	−8.9	79.21
9	199	204	5	18.1	327.61
10	218	195	−23	−9.9	98.01
sum			−131		1526.93

$H_O : \mu \geq 0$
$H_a : \mu < 0$

$\alpha = 0.05$

$df = n - 1 = 9$

$$t = \frac{\overline{x_d} - \mu_d}{\frac{s_d}{\sqrt{n}}}$$

$$t = \frac{-13.1 - 0}{\frac{13.025}{\sqrt{10}}}$$

$t = -3.18$

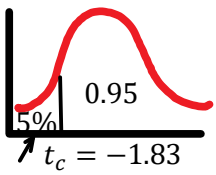
$$\bar{x}_d = \frac{\sum x_d}{n}$$

$$\bar{x}_d = -\frac{131}{10} = -131$$

$$s_d = \sqrt{\frac{\sum (x_i - \mu)^2}{n - 1}}$$

$$s_d = \sqrt{\frac{1526.93}{10 - 1}}$$

$s_d = 13.025$



$t = -3.18$

There is sufficient evidence the null hypothesis is true and therefore ; *Reject* H_O.

$$CI = \overline{x_d} \pm t_c \frac{s_d}{\sqrt{n}}$$

$$CI = -13.1 \pm 1.833 \frac{13.025}{\sqrt{10}}$$

$CI = -13.1 \pm 7.55$

95% confident the mean is in this range.

$(-20.65, -5.55)$

Two class test scores

$n_1 = 15$ $\overline{x_1} = 82$ $s_1 = 2.4$
$n_2 = 12$ $\overline{x_2} = 84$ $s_2 = 1.7$

$H_O : \mu = 0$
$H_a : \mu \neq 0$

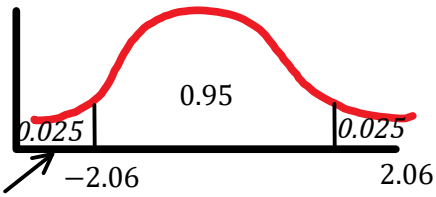
$\alpha = 0.05$ $\frac{\alpha}{2} = 0.025$

$\mu_1 - \mu_2 = 0$

$$df = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{\left(\frac{s_1^2}{n_1}\right)^2}{n_1 - 1} - \frac{\left(\frac{s_2^2}{n_2}\right)^2}{n_2 - 1}}$$

$df = 24.7 = 25$

$t_c = 2.0595$



$z = -2.53$

$$t = \frac{(\overline{x_1} - \overline{x_2}) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

$t = -2.53$

The significance...*Reject* H_O