

More Review Problems

2. SRS

1. $H_0: \mu_M = \mu_F$ $H_a: \mu_M \neq \mu_F$

normal dist 0

$t = \frac{\bar{X}_M - \bar{X}_F}{\sqrt{\frac{s_M^2}{n_M} + \frac{s_F^2}{n_F}}} = t = \frac{25.34 - 24.94}{\sqrt{\frac{5.082^2}{133} + \frac{5.44^2}{162}}} = .654$

$n \geq 30$

$\sqrt{\frac{s_M^2}{n_M} + \frac{s_F^2}{n_F}}$

$\sqrt{\frac{5.082^2}{133} + \frac{5.44^2}{162}}$

book p-value $> (2.5)/2 =$ P-value 7.5
 calc p-value = $.514$

Fail to reject H_0 . There is no evidence that males + females differ in their average social insight. There is about a 51% chance of getting a difference in mean scores as extreme as I did if H_0 is true.

2. $H_0: \mu = 0$ $H_a: \mu < 0$ $\mu = \text{After} - \text{Before}$

$\bar{x} = -.984$ $s_x = .6147$ $n = 25$

$t = \frac{\bar{x} - \mu}{s/\sqrt{n}} = \frac{-.984 - 0}{.6147/\sqrt{25}} = -7.978$

book P-value ~ 0
 calc P-value = $1.66E-8 \sim 0$

Reject H_0 , because P-value $<$ α level of $.05$
 • There is strong evidence that phosphoric acid significantly decreases the mass of teeth.
 There is almost no chance of getting an \bar{x} this extreme if H_0 is true.

2 sample
t Test

Matched
Pairs
t Test

3. $m = .015$ $\hat{p} = .2$ $n = ?$

$$CI = \hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

estimate margin of error

$$m = z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$$m^2 = \left(z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \right)^2$$

$$m^2 = (z^*)^2 \frac{\hat{p}(1-\hat{p})}{n}$$

$$n \geq \frac{(z^*)^2 \hat{p}(1-\hat{p})}{m^2}$$

a) $n \geq (2.576)^2 \frac{(.2)(.8)}{(.015)^2}$

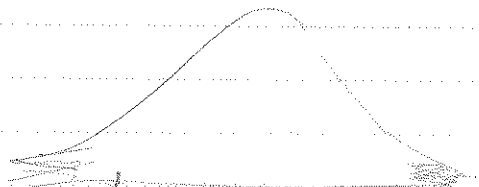
$$n \geq 4718.77 \sim \boxed{4718}$$

b) $m = z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = (2.576) \sqrt{\frac{(.1)(.9)}{4718}} = \boxed{.01125}$

prop
elect

4. $p_0 = .59$ $\hat{p} = \frac{150}{272} = .55$

$H_0: p = .59$ $H_a: p \neq .59$

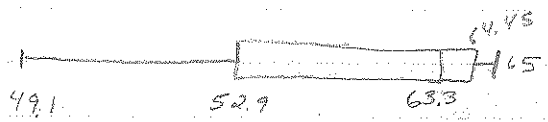


$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} = \frac{.551471 - .59}{\sqrt{\frac{(.59)(.41)}{272}}} = -1.29 \rightarrow P\text{-value} = (.0982) \cdot 2 =$$

[P-value = .1964 book
= .1964 calc]

Fail to reject H_0 . There is no significant evidence that the MMSTC students differ politically on their choice for the republican governor than the rest of the voters in the state of Michigan. We would get a \hat{p} of .55 almost 20% of the time by chance alone if H_0 is true.

5. a)



78.1%

Z score



X

SAS ✓
normal NO

Skewed left - no outliers

Just by looking we can see the atmosphere differed significantly

b)

$$95\% \text{ CI} = \bar{x} \pm t^* s_x / \sqrt{n}$$

$$\bar{x} = 59.59 \quad s_x = 6.26 \quad n = 9$$

$$59.59 \pm (2.306) (6.26 / \sqrt{9}) =$$

$$\boxed{54.78 \text{ to } 64.4 \text{ book}}$$

$$\boxed{54.781 \text{ to } 64.397 \text{ calc}}$$

P. 525
last paragraph

• 95 out of 100 samples created will capture the true population mean value of nitrogen in ancient atmosphere.

• or We are 95% confident our interval will capture the true population mean.

c)

$$H_0: \mu = 78.1\% \quad H_a: \mu \neq 78.1\%$$

$$t = \frac{\bar{x} - \mu}{s_x / \sqrt{n}} = \frac{59.59 - 78.1}{6.24 / \sqrt{9}} = -8.87$$

↓

P-value ~ 0

Reject H_0 . There is strong evidence that the percentage of nitrogen in the atmosphere in the Cretaceous era is significantly different than the percentage of nitrogen in our atmosphere today.

There is almost no chance of getting a mean value of nitrogen as extreme as we did by chance alone if H_0 is true. Results may not be conclusion as not

