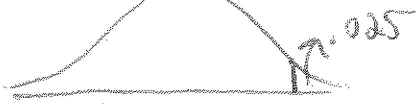
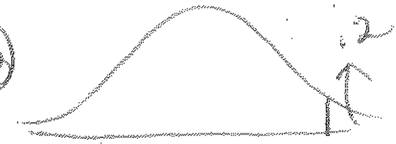
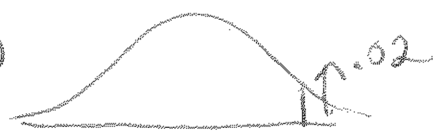
Inference Practice Worksheet #5

① 

df = 10 $t^* = 2.228$ CL = .90

② 

df = 17 $t^* = 0.863$ CL = .60

③ 

df = 6 $t^* = 2.612$ CL = .96

④ State: We will create an 80% confidence interval for 1-sample means to estimate the true population mean measurement.

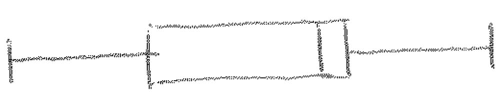
Plan: μ = the true population mean measurement

Conditions:

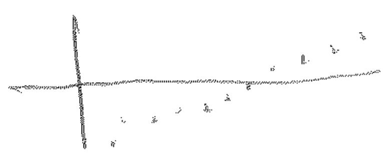
Random - The problem does not state the measurements were randomly selected. No reason to assume these measurements aren't representative of the population of all measurements.

Independence - all measurements ≥ 10(16) Condition met

Large Counts - Sample size small



No apparent outliers



NPP shows linear trend. Normal Approximation appropriate

Do: $n = 16$ $CL = .8$ $t^* = 1.341$ $df = 15$ $\bar{x} = 97.9375$

$s = 12.6463$ $se = \frac{12.6463}{\sqrt{16}} = 3.1616$

$97.9375 \pm 1.341\left(\frac{12.6463}{\sqrt{16}}\right)$ $(93.699, 102.18)$

We are 80% confident the true population mean measurement lies in the interval 93.699 to 102.18 for a sample size of 16 measurements.

(5) $t^* = 2.131$ $97.9375 \pm 2.131(3.1616)$

$(91.199, 104.68)$

We are 95% confident the true population mean measurement lies in the interval 93.699 to 102.18 for a sample size of 16 measurements.

(6) The 95% confidence interval is larger because the critical value of 2.131 is larger than the 80% confidence interval critical value of 1.341. Larger critical value results in larger margin of error.

(7) A sample size of 34 results in 33 degrees of freedom. Using the table of critical values for a t-distribution we would need to be conservative and use df = 30. Therefore $t^*_{.90}(30) = 2.75$.

$n = 34$ $df = 33$ $se = \frac{.1998}{\sqrt{34}} = .0343$ $.4224 \pm 2.75(.0343)$

$(0.3281, 0.5167)$

We are 99% confident the true population mean value for r lies in the interval 0.3281 to 0.5767 for a sample size of 34 studies.

(8) State: $H_0: \mu = 5$ mg
$H_a: \mu > 5$ mg

H_0: the true mean level of tar in cigarettes is 5mg.
H_a: the true mean level of tar in cigarettes is greater than 5mg

where: μ = the true population mean level of tar in cigarettes

Plan: 1-sample t-test for means

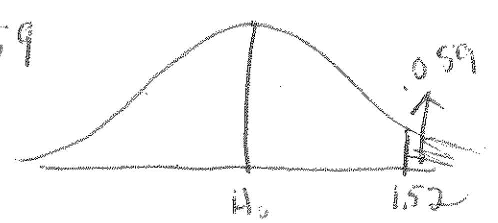
Conditions
Random - The problem states a simple random sample of 15 cigarettes was selected.

Independence - population of all cigarettes $\geq 10(15)$
Condition met

Large Counts - The problem states the population distribution of tar in cigarettes is approximately normal.

Do: $n = 15$ $\bar{x} = 5.63$ $s = 1.61$ $se = \frac{1.61}{\sqrt{15}} = .4157$ $df = 14$ $\alpha = .05$

$P\left(t > \frac{5.63 - 5}{.4157}\right) = P\left(t > 1.516\right) = .0759$



Since our p-value of 0.0759 is greater than our significance level α = .05, we have evidence to fail to reject the null hypothesis. We don't have enough evidence to possibly conclude the true population mean level of tar is more than 5 mg for a sample size of 15 cigarettes. Our data is not statistacally significant.

(9) State: H_0: $\mu = \$90,000$
H_a: $\mu \neq \$90,000$ (* Note: 2 sided!)

H_0: the true population mean selling price for homes in this city is \$90,000
H_a: the true population mean selling price for homes in this city is not \$90,000.

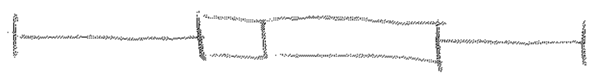
where: μ = the true population mean selling price for homes in this city

Plan: 1-sample t-test for means

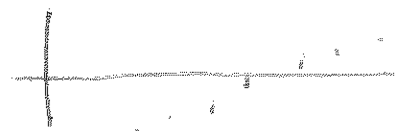
Conditions:
Random - The problem does not state the sales were randomly selected. No reason to assume these sales are not representative of the population of all home sales in this city.

Independence - population of all homes in this city ≥ 10(8)
Condition met

Large Counts - Small sample size.



Slight skewness but not apparent outliers.



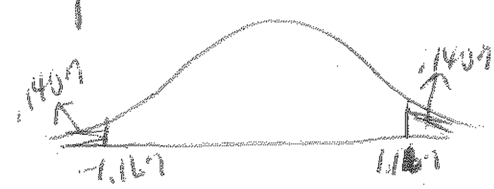
NPP shows linear pattern. Normal approximation appropriate.

Do: $n=8$ $df=7$ $\bar{x}=\$84{,}500$ $s=13341.66$ $s_{\bar{x}}=\frac{13341.66}{\sqrt{8}}$

$\alpha=.05$ $=4716.99$

$$2P\left(t<\frac{84{,}500-90000}{4716.99}\right)=2P(t<-1.167)=0.2814$$

(*Note: Calc KNOWS it's 2-sided when you choose "$\neq$". The p-value in calc is already doubled.)



Since our p-value of 0.2814 is greater than our significance level $\alpha=.05$ we have evidence to fail to reject the null hypothesis. We do not have enough evidence to possibly conclude the true mean selling price of homes in this city is not \$90,000, ~~Our data~~ for sample size of 8 homes. Our data is not statistically significant.