Name TEACHER

Perform a hypothesis test for each claim. You may perform a p-value test, or a critical value test. Show any calculations. Fill in the required blanks.

1) A local group claims that the police issue at least 60 speeding tickets a day in their area. To prove their point, they randomly select 31 days. Their research yields the number of tickets issued for each day. The sample mean is 60.4, and their sample standard deviation is 12.2. At $\alpha = 0.01$, test the group's claim.

Ho: $\mu \geq 60$ claim ___left___ – tailed test

Ha: $\mu < 60$ formula
standardized test statistic: ___.1825___

p-value: _____ or critical value: -2.33
Calc.
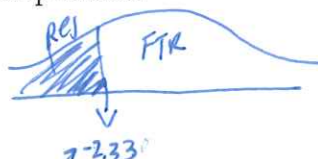
rej FTR
-2.33

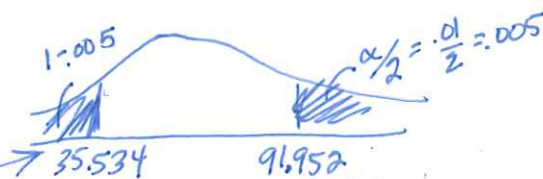reject Ho or fail to reject Ho ___Fail To Reject Ho___

Statement addressing claim: ___Insufficient Evidence to support/Reject___
___Claim that police issue at least 60 speeding tickets___
___a day___

2) A local bank needs information concerning the standard deviation of the checking account balances of its customers. From previous information it was assumed to be $250. A random sample of 61 accounts was checked. The standard deviation was $286.20. At $\alpha = 0.01$, test the bank's assumption. Assume that the account balances are normally distributed.

Ho: $\sigma = 250$ claim ___Two___ – tailed test

Ha: $\sigma \neq 250$ formula
standardized test statistic: $78.63 = x^2$

p-value: _____ or critical value: _____

1-.005

$\frac{\alpha}{2} = \frac{.01}{2} = .005$

35.534   91.952

$df = 61-1 = 60$

reject Ho or fail to reject Ho ___Fail To Reject Ho___

Statement addressing claim: ___not enough evidence to reject the Ho___
___or claim that the Stand. Dev. of balances is $250___

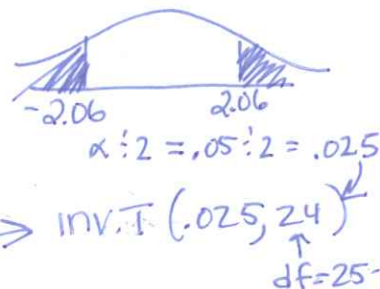$x^2 = \frac{(n-1)(s)^2}{\sigma^2}$

$x^2 = \frac{60(286.20)^2}{250^2}$

3) A manufacturer claims that the mean lifetime of its fluorescent bulbs is 1100 hours. A homeowner selects 25 bulbs and finds the mean lifetime to be 1090 hours with a standard deviation of 80 hours. Test the manufacturer's claim. Use $\alpha = 0.05$.

use T

Ho: $\mu = 1100$ claim   **Two** - tailed test

Ha: $\mu \neq 1100$ *Formula* standardized test statistic: $-.625$

p-value: _____ or critical value: ± 2.06

-2.06 2.06

$\alpha \div 2 = .05 \div 2 = .025$

$\rightarrow$ inv.T $(.025, 24)$

$df = 25 - 1$

reject Ho or fail to reject Ho **Fail to Reject Ho**

Statement addressing claim: __Not sufficient evidence to__ __reject the claim of manufacturer__

$T = \dfrac{\bar{x} - \mu}{SD/\sqrt{n}} = \dfrac{1090 - 1100}{80/\sqrt{25}}$

$= -.625$

4) The engineering school at a major university claims that 20% of its graduates are women. In a graduating class of 210 students, 58 were women. Does this suggest that the school is believable? Use $\alpha = 0.05$.

Ho: $p = .20$ claim   **Two** - tailed test

Ha: $p \neq .20$ *Formula* $\hat{p} = \dfrac{58}{210} = .276$

standardized test statistic: 2.75

p-value: _____ or critical value: ± 1.96

$\rightarrow$ invnorm $(.025, 0, 1)$
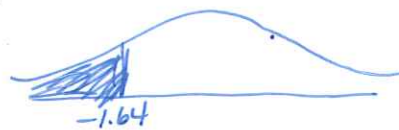
$\alpha \div 2 = .05 \div 2 = .025$
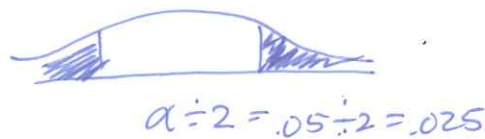
reject Ho or fail to reject Ho **Reject Ho**

Statement addressing claim: __Since we have evidence to__ __Reject the Ho, then we can reject the__ __claim that grad rate is 20%__

$z = \dfrac{.276 - .2}{\sqrt{\dfrac{(.2)(.8)}{210}}} = \boxed{2.75}$

use z

5) A trucking firm suspects that the mean lifetime of a certain tire it uses is less than 35,000 miles. To check the claim, the firm randomly selects and tests 54 of these tires and gets a mean lifetime of 34,570 miles with a standard deviation of 1200 miles. At $\alpha = 0.05$, test the trucking firm's claim.

Ho: $\mu \geq 35000$ __Left__ - tailed test

Ha: $\mu < 35000$ _Formula_
claim   standardized test statistic: __-2.63__

p-value: __.004__   or   critical value: __-1.64__

$\hookrightarrow$ calc $\alpha \to$ invNorm(.05, 0, 1)

reject Ho or fail to reject Ho __Reject Ho__

Statement addressing claim: _Since we have sufficient evidence_
to reject Ho we can support the Ha → or claim
that the mean lifetime use of tire is 35000 miles

$Z = \dfrac{34570 - 35000}{1200 / \sqrt{54}}$

$= \dfrac{-430}{163.3} = -2.63$

6) A recent study claimed that at least 15% of junior high students are overweight. In a sample of 160 students, 18 were found to be overweight. At $\alpha = 0.05$, test the claim.

Ho: $p \geq .15$ claim   __Left__ - tailed test

Ha: $p < .15$ _Formula_
standardized test statistic: __-1.33__

p-value: __.092__   or   critical value: __-1.64__

$\hookrightarrow$ invnorm(.05, 0, 1) $\Rightarrow -1.64$

$\hat{p} = \dfrac{18}{160} = .1125$

reject Ho or fail to reject Ho __Fail to reject Ho__

Statement addressing claim: _Insufficient evidence to reject_
the Ho which is the claim of there being at least
15% of jr high st. overweight.

$Z = \dfrac{\hat{p} - p_0}{\sqrt{\dfrac{p_0 q_0}{n}}}$ $q_0 = 1-.15$

$= \dfrac{.1125 - .15}{\sqrt{\dfrac{(.15)(.85)}{160}}}$

$= \dfrac{-.0375}{.0282} = -1.33$

use T

7) The Metropolitan Bus Company claims that the mean waiting time for a bus during rush hour is less than 7 minutes. A random sample of 20 waiting times has a mean of 5.2 minutes with a standard deviation of 2.1 minutes. At $\alpha = 0.01$, test the bus company's claim. Assume the distribution is normally distributed.

Ho: $\mu \geq 7$ ___Left___ – tailed test

formula

Ha: $\mu < 7$ claim   standardized test statistic: -3.83

p-value: $.0005$ or   critical value: -2.539

$\hookrightarrow$ invT$(.01, 19)$ df

$t = \dfrac{5.2-7}{2.1/\sqrt{20}}$

reject Ho or fail to reject Ho __Reject Ho__

Statement addressing claim: There is sufficient evidence to support the claim (in Ha) since we reject Ho. The ~~weigh~~ wait time is less than 7 min

$t = \dfrac{-1.8}{.469}$

$t = -3.83$

8) The heights (in inches) of 20 randomly selected adult males has a variance of 2.98. Test the claim that the variance is less than 6.25. Assume the population is normally distributed. Use $\alpha = 0.05$.

S^2

Ho: $\sigma^2 \geq 6.25$ ___Left___ – tailed test

Ha: $\sigma^2 < 6.25$ claim   standardized test statistic: 9.059

p-value: _____   or   critical value: 10.117

chi sq chart $\alpha = 1 - .05 = .95$ df = 19

reject Ho or fail to reject Ho __Reject Ho__

Statement addressing claim: Since we reject the Ho, we can support the claim that variance of height is less than 6.25

$\chi^2 = \dfrac{(19)(2.98)}{6.25} =$