MAT 117 **Single Mean *t* Hypothesis Test**

A job placement director claims that the average starting salary for nurses is $24,000. A researcher questions this claim – she thinks the true mean is lower than that figure. She takes a random sample of 10 starting nurses, and gets the following data:

23,400	19,000	20,200	22,000	22,145
25,150	24,530	25,000	21,000	25,500

Is there enough evidence to reject the director's claim at $\alpha = 0.05$?

Note: Using my TI-83, I found a mean of $22,792.50 and a standard deviation of $2273.37.

1. What is the population mean to be tested?

μ = the average _____ among _____

2. State the null hypothesis symbolically.

3. State the alternative hypothesis symbolically.

4. Find std error and draw the hypothetical *x*-bar distribution based on H_0 being true.

$\bar{x}$ distribution t distribution

5. Calculate the *t* test statistic. Draw on the above graph where our sample mean falls on the hypothetical *x*-bar distribution. Draw where the *t* test statistic falls on the *t* distribution. Shade the latter picture appropriately for our H_a and find the *P*-value.

```
tcdf(start_shading_t,  stop_shading_t,  degrees_of_freedom)
```

6. Repeat finding *t* test statistic and P-value using the TTest on the TI calculator.

7. Do you reject the null hypothesis?

8. Write your conclusion in the context of the problem.

Single Mean *t* Hypothesis Test **ANSWERS**

A job placement director claims that the average starting salary for nurses is $24,000. A researcher questions this claim – she thinks the true mean is lower than that figure. She takes a random sample of 10 starting nurses, and gets the following data:

23,400	19,000	20,200	22,000	22,145
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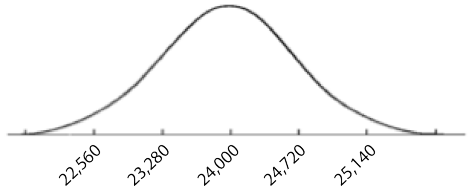
Is there enough evidence to reject the director's claim at $\alpha = 0.05$?

Note: Using my TI-83, I found a mean of $22,792.50 and a standard deviation of $2273.37.

1. What is the population mean to be tested? μ = the average starting salary among all nurses.
2. State the null hypothesis symbolically. H_0 is "$\mu = 24000$"
3. State the alternative hypothesis symbolically. H_a is "$\mu < 24000$"

4. Find std error and draw the hypothetical *x*-bar distribution based on H_0 being true.

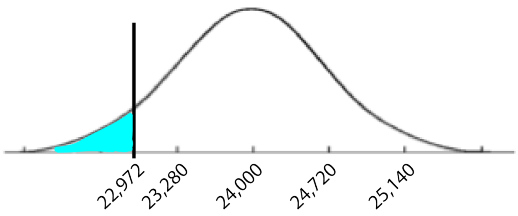
$$s.e. = \frac{\sigma}{\sqrt{n}} \approx \frac{s}{\sqrt{n}} = \frac{2273.37}{\sqrt{10}} \approx 718.90$$



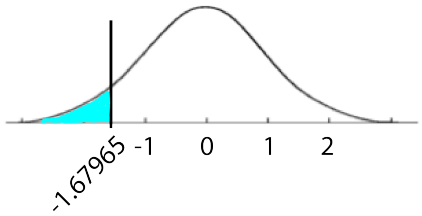
$\bar{x}$ distribution

5. Calculate the *t* test statistic. Draw on the above graph where our sample mean falls on the hypothetical *x*-bar distribution. Draw where the *t* test statistic falls on the *t* distribution. Shade the latter picture appropriately for our H_a and find the *P*-value.

$$t = \frac{\text{observed} - \text{mean}}{\text{st.dev.}} = \frac{22792.50 - 24000}{718.90} \approx -1.67965$$



$\bar{x}$ distribution



t distribution

P-value = tcdf(-1000, -1.67965, 9) = 0.0637, which is **not** less than the significance level 0.05.

7. Do you reject the null hypothesis? No, the P-value (0.0637) is **not** small so we do **not** reject H_0.

8. Write your conclusion in the context of the problem. "There is not statistically significant evidence to conclude that the average starting salary of nurses is less than $24000."