

# A quick guide to Hypothesis Testing

For MATH 3307

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# What is the Alternate Hypothesis ( $H_a$ )?

Less Than

Greater Than

Does not equal

Is the confidence level ( $\alpha$ ) known?

Yes

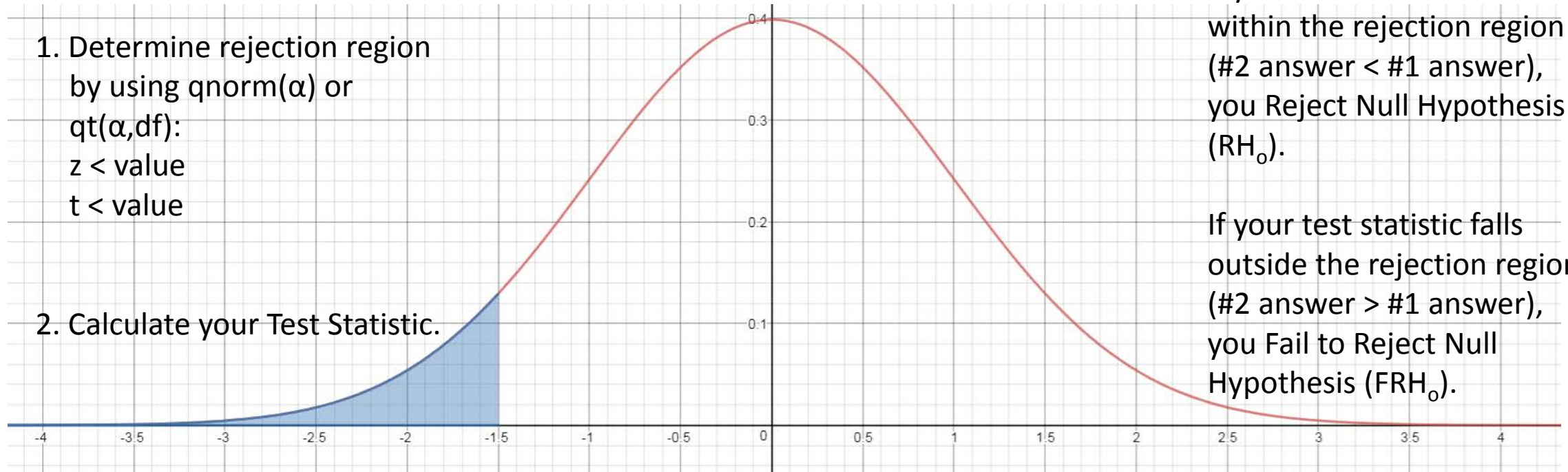
No

# Alternate Hypothesis: Less Than

## Confidence Level: Known

1. Determine rejection region  
by using  $qnorm(\alpha)$  or  
 $qt(\alpha, df)$ :  
 $z < \text{value}$   
 $t < \text{value}$

2. Calculate your Test Statistic.



3. If your test statistic falls  
within the rejection region  
(#2 answer  $<$  #1 answer),  
you Reject Null Hypothesis  
( $RH_0$ ).

If your test statistic falls  
outside the rejection region  
(#2 answer  $>$  #1 answer),  
you Fail to Reject Null  
Hypothesis ( $FRH_0$ ).

4. Calculate your p-value by using  $pnorm(\#2 \text{ answer})$  or  $pt(\#2 \text{ answer}, df)$

5. Using your p-value (#4 answer) and your confidence level ( $\alpha$ ), determine the following:  
If  $p < \alpha$ , you Reject the Null Hypothesis ( $RH_0$ ).  
If  $p > \alpha$ , you Fail to Reject the Null Hypothesis ( $FRH_0$ ).

[I have more hypotheses to test](#)

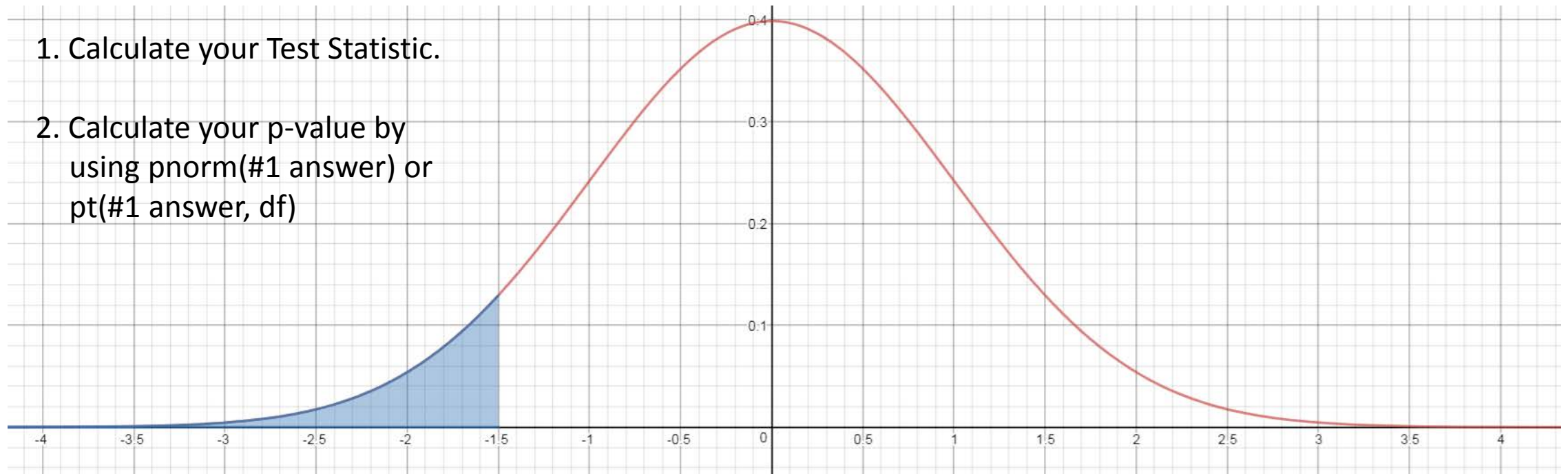
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# Alternate Hypothesis: Less Than

## Confidence Level: Not Known

1. Calculate your Test Statistic.

2. Calculate your p-value by using `pnorm(#1 answer)` or `pt(#1 answer, df)`



3. Using your p-value (#2 answer), determine the following:

If  $p < .01$ , you Reject the Null Hypothesis ( $RH_0$ ) with overwhelming evidence.

If  $.01 < p < .05$ , you Reject the Null Hypothesis ( $RH_0$ ) with strong evidence.

If  $.05 < p < .10$ , you Reject the Null Hypothesis ( $RH_0$ ) with weak evidence.

If  $p > .10$ , you Fail to Reject the Null Hypothesis ( $FRH_0$ ).

[I have more hypotheses to test](#)

[I am done hypothesizing](#)

Is the confidence level ( $\alpha$ ) known?

Yes

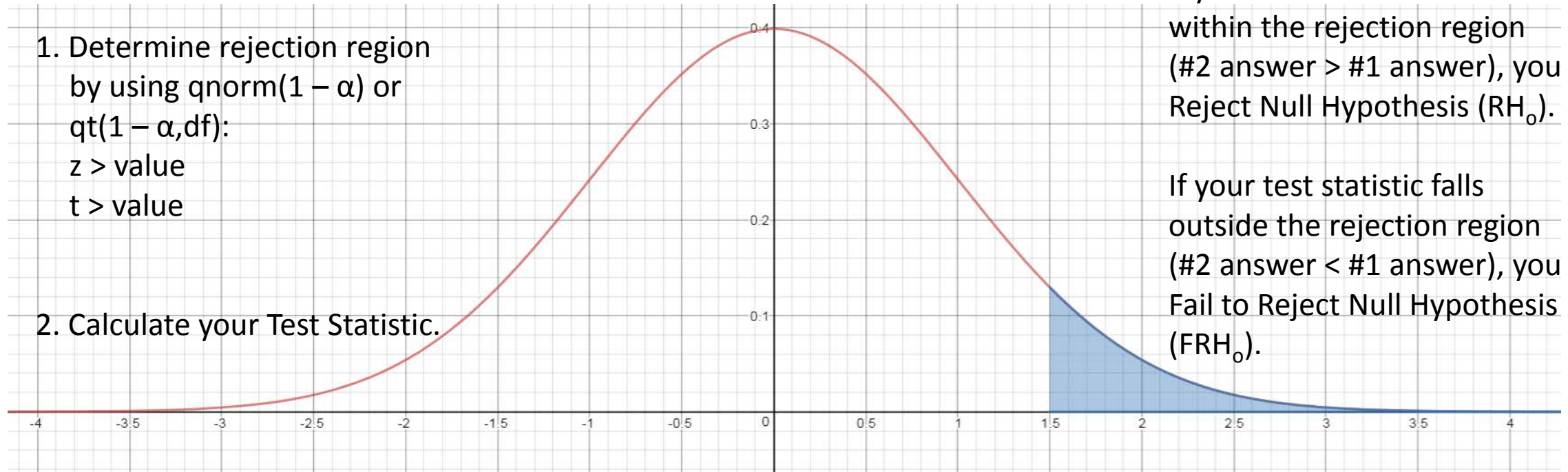
No

# Alternate Hypothesis: Greater Than

## Confidence Level: Known

1. Determine rejection region by using  $qnorm(1 - \alpha)$  or  $qt(1 - \alpha, df)$ :  
 $z > \text{value}$   
 $t > \text{value}$

2. Calculate your Test Statistic.



3. If your test statistic falls within the rejection region (#2 answer  $>$  #1 answer), you Reject Null Hypothesis ( $RH_0$ ).

If your test statistic falls outside the rejection region (#2 answer  $<$  #1 answer), you Fail to Reject Null Hypothesis ( $FRH_0$ ).

4. Calculate your p-value by using  $1 - pnorm(\text{\#2 answer})$  or  $1 - pt(\text{\#2 answer}, df)$

5. Using your p-value (#4 answer) and your confidence level ( $\alpha$ ), determine the following:  
If  $p < \alpha$ , you Reject the Null Hypothesis ( $RH_0$ ).  
If  $p > \alpha$ , you Fail to Reject the Null Hypothesis ( $FRH_0$ ).

[I have more hypotheses to test](#)

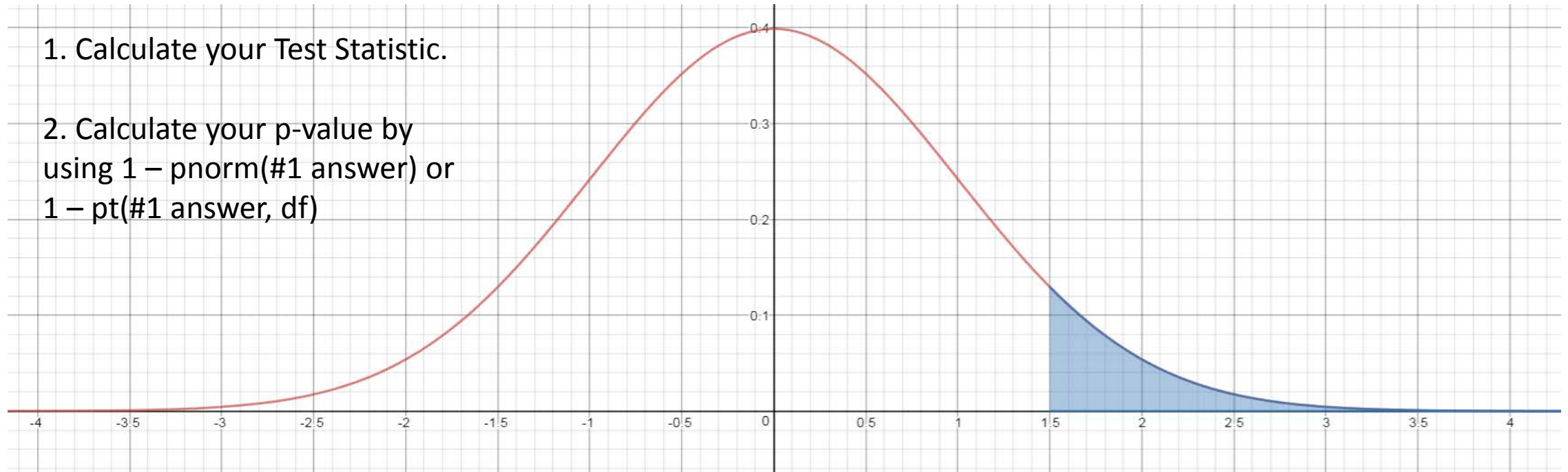
[I am done hypothesizing](#)

# Alternate Hypothesis: Greater Than

## Confidence Level: Not Known

1. Calculate your Test Statistic.

2. Calculate your p-value by using  $1 - \text{pnorm}(\#1 \text{ answer})$  or  $1 - \text{pt}(\#1 \text{ answer}, \text{df})$



3. Using your p-value (#2 answer), determine the following:

If  $p < .01$ , you Reject the Null Hypothesis ( $H_0$ ) with overwhelming evidence.

If  $.01 < p < .05$ , you Reject the Null Hypothesis ( $H_0$ ) with strong evidence.

If  $.05 < p < .10$ , you Reject the Null Hypothesis ( $H_0$ ) with weak evidence.

If  $p > .10$ , you Fail to Reject the Null Hypothesis ( $H_0$ ).

[I have more hypotheses to test](#)

[I am done hypothesizing](#)



Is the confidence level ( $\alpha$ ) known?

Yes

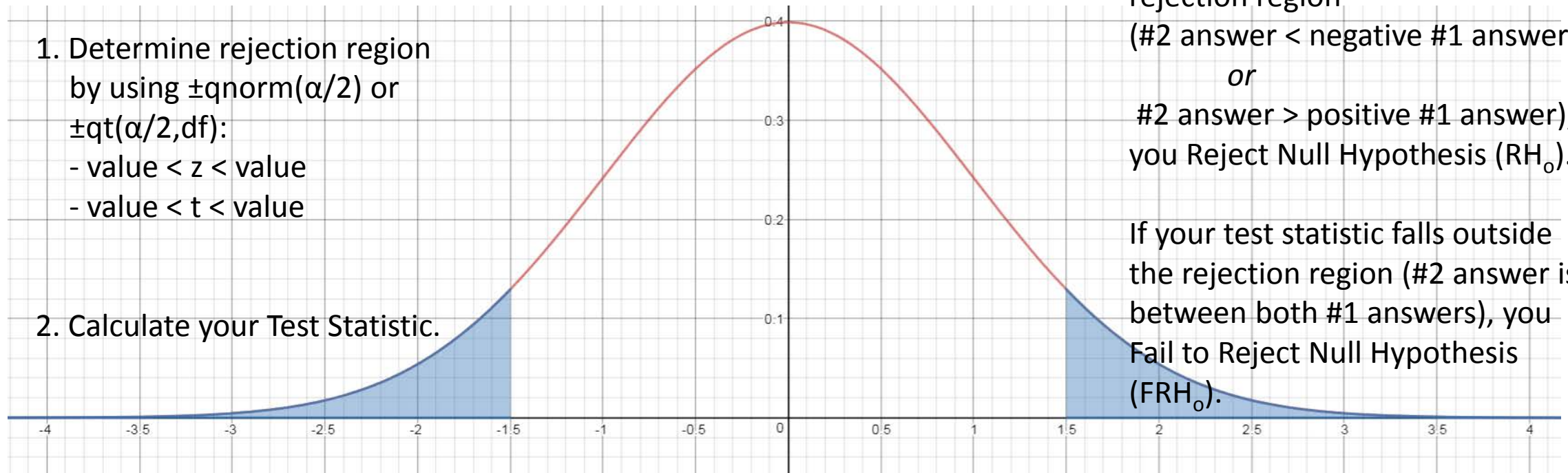
No

# Alternate Hypothesis: Does Not Equal

## Confidence Level: Known

3. If your test statistic falls within the rejection region  
(#2 answer < negative #1 answer  
or  
#2 answer > positive #1 answer),  
you Reject Null Hypothesis ( $RH_0$ ).

If your test statistic falls outside  
the rejection region (#2 answer is  
between both #1 answers), you  
Fail to Reject Null Hypothesis  
( $FRH_0$ ).



1. Determine rejection region  
by using  $\pm qnorm(\alpha/2)$  or  
 $\pm qt(\alpha/2, df)$ :  
- value < z < value  
- value < t < value

2. Calculate your Test Statistic.

4. Calculate your p-value by using  $2 * pnorm(\text{negative \#2 answer}_1)$  or  $2 * pt(\text{negative \#2 answer}_1, df)$

5. Using your p-value (#4 answer) and your confidence level ( $\alpha$ ), determine the following:

If  $p < \alpha$ , you Reject the Null Hypothesis ( $RH_0$ ).

If  $p > \alpha$ , you Fail to Reject the Null Hypothesis ( $FRH_0$ ).

[I have more hypotheses to test](#)

[I am done hypothesizing](#)

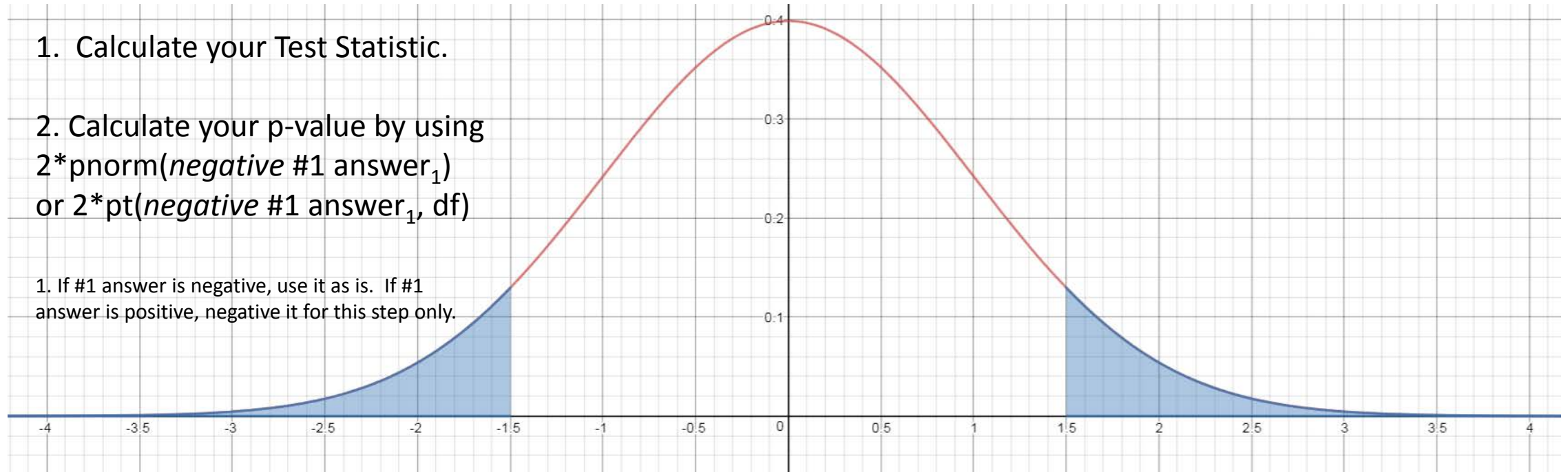
1. If #2 answer is negative, use it as is. If #2 answer is positive, negative it for this step only.

# Alternate Hypothesis: Does Not Equal Confidence Level: Not Known

1. Calculate your Test Statistic.

2. Calculate your p-value by using  
 $2 * \text{pnorm}(\text{negative \#1 answer}_1)$   
or  $2 * \text{pt}(\text{negative \#1 answer}_1, \text{df})$

1. If #1 answer is negative, use it as is. If #1 answer is positive, negative it for this step only.



3. Using your p-value (#2 answer), determine the following:

If  $p < .01$ , you Reject the Null Hypothesis ( $RH_0$ ) with overwhelming evidence.

If  $.01 < p < .05$ , you Reject the Null Hypothesis ( $RH_0$ ) with strong evidence.

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If  $p > .10$ , you Fail to Reject the Null Hypothesis ( $FRH_0$ ).

[I have more hypotheses to test](#)

[I am done hypothesizing](#)

See ya!

[Click here to end.](#)