P-value (Probability Value)

If the H_0 is True, a P-value of the test is the probability of obtaining a sample statistic with a value as extreme than the one determined from the sample.

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*Decision Rule

If P-value $\leq \alpha$, reject H_0/Accept H_a

If P-value $> \alpha$, fail to reject H_0

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Steps for Hypothesis Testing:

1. State H_0
   H_a
2. Specify "level of significance" $- \alpha$
   generally given in problem
   If not given, use $\alpha = .05$
3. Determine test statistic, its standardized value and sketch. (z)
   $n \geq 30$ use normal chart
   $n < 30$ use "t-chart"

$$z = \frac{\bar{x} - \mu}{(\sigma/\sqrt{n})}$$

$$t = \frac{\bar{x} - \mu}{(\sigma/\sqrt{n})}$$

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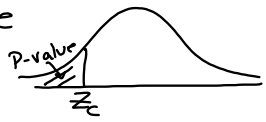
4. Find P-value



5. Use decision rule
   P-value $\leq \alpha$ Reject H_0
   Pvalue $> \alpha$ Fail to reject
6. Write a statement to interpret the decision in context of original claim.

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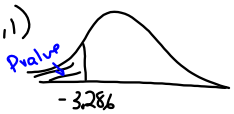
1. H_0: $\mu \geq 50$mpg (Reject H_0)
   H_a: $\mu < 50$mpg (Support my claim)
2. $\alpha = .05$
3. $n = 30$ $n \geq 30$
   $\bar{x} = 47$mpg z-test
   $s = \sigma = 5$mpg (normal chart)

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \frac{47-50}{5/\sqrt{30}} = -3.286$$

4. Pvalue/normalcdf(-1E99, -3.286, 0, 1)
   Pvalue = .0005



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⑤ P-value α

.0005 < .05

Reject H_0

⑥ If the average MPG of the hybrid car is 50mpg, the probability of a sample of 30 cars having an average of 47mpg is very unlikely. (.0005)

∴ there is enough evidence to reject H_0

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