Regents Review #9 - Inference, Experimental Design, Regression Section #24

1.

	Random Selection	Random Assignment Trmts (Exp)
Used in experiments	Sometimes	✓
Used in observational studies	✓	
Allows generalization to the population	✓	
Allows a cause and effect conclusion Exp.		✓

2. Experiment: * Treatment w/ Random assignment
- Measured response
* Determines cause + effect

Observational Study:
- No treatment
- Includes survey
- Can not determine cause + effect

3. Sample:
Part of a population

Population:
The entire group being studied

4. 95% Confidence Interval: Mean (Est.) ± 2 SD

Margin of Error: 2 S.D.

5. If value is within your confidence interval, there's nothing unusual → NOT Statistically Significant

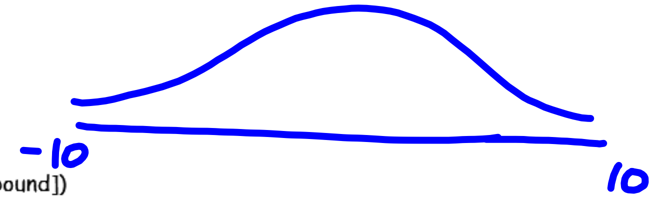
If value is outside of your confidence interval, then it's unusual → Statistically Significant

6. Closer your value is to the mean, the more consistent it is with your data (higher the probability), there's nothing unusual → NOT Statistically Significant

Further your value is from the mean, the more unusual it becomes (lower the probability)→Statistically Significant

Regents Review #10 - Normal Distributions, Probability, Average Rate of Change

1. $Z = \dfrac{\text{Value} - \text{Mean}}{\text{S.D.}}$



Normalcdf([left/lower z bound], [right/upper z bound])

↓

2^{nd}→VARS→2:normalcdf(

a. The distribution of lifetimes of a particular brand of car tires has a mean of 51,200 miles and a standard deviation of 8,200 miles. Assuming that the distribution of lifetimes is approximately normally distributed and rounding your answers to the nearest thousandth, find the probability that a randomly selected tire lasts between 55,000 and 65,000 miles.

$Z_{55} = \dfrac{55{,}000 - 51{,}200}{8{,}200} = .4634$

$Z_{65} = \dfrac{65{,}000 - 51{,}200}{8{,}200} = 1.6829$

normalcdf(.4634, 1.6829)

.275

2. Independence: one event does not affect another

Mutually Exclusive (Disjoint): No "both" $\boxed{OO}$

$P(A \cap B) = 0$

Complement: $P(A) = 1 - P(A^c)$ $P(A^c) = 1 - P(A)$

opposite ex: rain and no rain

3. To prove independence:

a. Using Conditional Probability: $P(A|B) = P(A) = P(A|B^c)$ not B

b. Using Multiplication Rule: $P(A \cap B) = P(A) * P(B)$

Example:

Given events A and B, such that P(A) = 0.6, P(B) = 0.5, and P(A U B) = 0.8, determine whether A and B are independent or not independent.

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$ (or, and)

$.8 = .6 + .5 - P(A \cap B)$

$P(A \cap B) = .3$

$P(A \cap B) \overset{?}{=} P(A) * P(B)$

$.3 \overset{?}{=} .6 * .5$

$.3 = .3$

$\therefore$ Independent

4. Average Rate of Change = $\dfrac{\Delta y}{\Delta x} = \dfrac{f(a) - f(b)}{a - b}$