MOD 14 - INTRODUCTION TO INFERENCE

Learning Goals

- Describe the relationship between inference and probability.
- Categorize research questions involving inference.
- 1) Suppose that we randomly draw five cards (one at a time without replacement) from a deck of cards and all five cards are the same color. Assume that we can only see the cards in the sample we have drawn, and we can NEVER know anything about the other cards in the deck.
 - a) Would we naturally assume that the cards in the deck are mostly one color?
 - b) Do we know for a fact that the cards in the deck are mostly one color?
- Suppose we randomly draw cards (one at time without replacement) from a fair deck of well-shuffled cards.
 - a) What is the probability that we draw two cards in a row that are the same color?
 - b) What is the probability that we draw three cards in a row that are the same color?
 - c) What is the probability that we draw four cards in a row that are the same color?
 - d) What is the probability that we draw five cards in a row that are the same color?
 - e) During the probability game we played in class, how many draws were required before a large majority of the class inferred that the deck was NOT, in fact, a fair deck of well-shuffled cards?

- 3) Assume we are working with a fair deck of well-shuffled cards. We randomly draw a sample of cards from the deck, and the probability of drawing that particular sample is less than p = 0.05 (i.e. the sample is very unusual based on our assumption that we have a fair deck of well-shuffled cards).
 - a) Can we state why the sample is unusual? Explain.
 - b) Is it reasonable to infer that the sample is NOT due to random chance and therefore the assumption that we are working with a fair deck of well-shuffled cards must be rejected? Explain, and try to use the words *unusual* and *random chance* in your explanation.
- 4) Complete the table.

Research Question	Type of Question Make an estimate about the population OR Test a claim about a population	Variable	Variable Type <i>Categorical</i> OR <i>Quantitative</i>
What proportion of Californians support gun reform?			
What percent of Californians are married?			
Do the majority of Californians support the Affordable Care Act?			
Is the average age when California residents get married over 30?			
What is the life span of Californians?			