Name: _____

Statistics Handout: Lesson 8.11

Topics: successive independent events, "at least one," sampling w/o replacement

Lesson 8.11 Guided Notes

Successive Independent Events

<u>Successive:</u> Events are successive if one happens after the other (i.e. _____)

<u>Independent:</u> Events are independent if knowing the outcome of one event _____ the probability of another event.

Example 1: What is the probability of getting "heads" 5x in a row?

Since the probabilities _____, you don't need a tree diagram!

Example 2: A free throw is a penalty shot in basketball. One of the NBA's best free throw shooters is Stephen Curry. He makes 90.6% of the free throws he attempts. Assume each free throw attempt is independent. What is the probability he makes 6 free throws in a row?

Example 3: Stephen Curry is fouled in many 3-point situations, so he often takes 3 free throws at a time. When he takes 3 free throws, what is the probability he makes the first two but misses the last one?
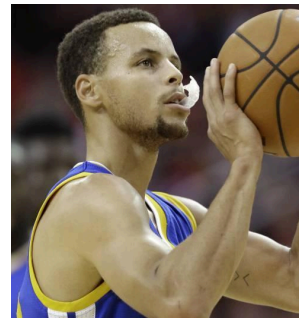
"At Least One" Scenarios

Example: Stephen Curry makes 90.6% of the free throws he attempts. Assume each of his free throw attempts are independent. What is the probability he makes at least one of his next 4 free throws?

<u>"At least one" scenarios:</u> When asked to find the probability of "at least one" occurrence of a successive independent event, take the _____ of the event that _____ occur.

$$P(\text{at least one}) = \underline{\hspace{5cm}}$$

Sampling Without Replacement

Example: You have a jar with 12 blue marbles and 8 red marbles. Imagine you sample marbles without replacement. What is the probability of drawing the following: blue, then red, then blue.
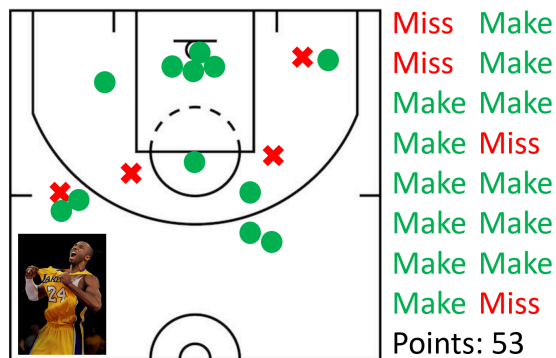
Lesson 8.11 Discussion

Testing Kobe's "Hot Hand"

<u>The "hot hand" theory:</u> When a player starts to make many shots in a row, the have a "hot hand" – their probability of making shots is higher than normal.

- Your shots are _____. Your current shot probability _____ on your previous shots.

a) Let's assume the "hot hand" doesn't exist. Each shot has an equal and independent probability of going in (44.7%). What is the probability of Kobe making an *insane* 8 shots in a row?

Miss   Make
Miss   Make
Make   Make
Make   Miss
Make   Make
Make   Make
Make   Make
Make   Miss
Points: 53

Kobe's 3rd quarter during his 81-point game

b) In his career, Kobe took 30,697 shots. Given this information and the probability of an 8-shot streak (calculated above), what is the expected number of times Kobe would get an 8-shot streak by chance?

The actual number* of 8-shot streaks Kobe had in his career: **47**

Discussion Question: Is this enough to disprove the "hot hand" theory? If yes, how so? If not, how else could you test the theory?