

## Activity 10

Name \_\_\_\_\_

### Craps

**Part I.** In this dice game, two six-sided die are tossed onto a long table.

1. Write the sample space (all possible outcomes) for the rolling of two die. Hint: there are 36 different outcomes.

2. If you were to place a bet on any a sum, which sum would be your best bet?

3. What is the probability of rolling a 7?

4. What is the compliment of the probability in #3? (What is the probability of not rolling a 7?)

5. What is the probability of waiting until your second roll before you get a 7? (Not rolling a 7, then rolling a 7).

6. Let's use Excel to create a chart of Geometric Probabilities.

**i.** Open Excel. Title the first column Number of Failures. For the first column, enter in the numbers 0 through 10. This represents the number of times we do not get a 7.

**ii.** Title the second column Geometric Probabilities. Put the cursor in the first open cell in this column. Type  $= (x/36) * (1-x/36)^{A2}$  (where  $x$  is the number of different ways a 7 can be rolled, see problems 3 & 4). Drag this down. These are the geometric probabilities.

**iii.** Now, click on the Chart Wizard. Create a Column Graph. Highlight the first column for Category X axis labels under the Series tab. Be sure to title the axes and the graph. You don't need a legend for this graph, so delete that. Paste the graph below.

7. Look at the graph. What specific number of failures is most likely before a seven is rolled? (Which geometric probability is the highest?)

8. If you were to add the heights of all the other bars out to infinity, what would be their height? How do your answers in 7 and 8 compare to the answers from 3 and 4?



3. Let's find the observed relative frequency distribution.

**i.** Count the number of times you rolled no 7's, one 7, two 7's, three 7's... and so on.

**ii.** In the Excel spreadsheet, enter these into the 5<sup>th</sup> column, titled Observed Frequencies. Make sure they line up with the numbers in the first column!

**iii.** Title the 6<sup>th</sup> column Observed Relative Frequencies. To get the relative frequencies, divide the frequencies by 22, since we did this experiment 22 times. Highlight the first cell in this column and type  $=E2/22$ . Drag this down.

**iv.** Click the Chart Wizard. Create a column graph. Click the Series tab. Remove all the series included except the Expected Probability Distribution and the Observed Relative Frequencies. Highlight the first column for Category X axis labels. Title the Graph "Expected vs. Observed Probability Distributions". Title the x-axis "Number of 7's Rolled" and the y-axis "Relative Frequency". Paste the graph below.

4. Compare the expected and the observed distributions. Are they similar? How are they different?

5. Describe the shape of the distributions in 3. (Symmetrical? Skewed? Multimodal? etc.)