Math 113: Classroom Activity 3 Name : _____
10 pts

Materials Needed:
Pair of dice.

Craps is a game that is very difficult to figure out theoretically (unless you've had some upper level mathematics courses) and is best done by simulation.

What we're going to do is determine the average length of a craps game by playing 36 games and finding the average number of rolls. We'll also use the results to find the chance of winning or losing a craps game.

Game of Craps

1. Roll a pair of dice. If a sum of 7 or 11 occurs, you win; if a sum of 2, 3, or 12 arises, then you lose; any other sum is called a point.
2. If you roll a point on your first roll, then you must continue to roll the dice. If you roll your point again before rolling a 7 then you win; if you roll a 7 before you roll your point again then you lose.

Here are some example rolls so you can see how the game is played.

Sample #	Initial Roll	Initial Result	Final Result	# of Rolls	Actual Rolls (you don't need to record these)
1	7	W	W	1	7
2	6	P	L	6	6, 8, 3, 11, 9, 7
3	5	P	W	12	5, 4, 10, 8, 4, 8, 8, 11, 9, 3, 10, 5
4	5	P	L	3	5, 4, 7
5	11	W	W	1	11
6	7	W	W	1	7
7	9	P	W	5	9, 5, 11, 8, 9
8	5	P	L	2	5, 7
9	7	W	W	1	7
10	4	P	L	3	4, 6, 7
11	3	L	L	1	3

and so on ...

Notice that the 7 is only a winner on the first roll. If you roll a 7 while you're trying to get a point, you lose. Also, the 2, 3, 11, and 12 are only special for the first roll. If you roll a 2, 3, 11, or 12 while trying to get your point, you ignore them. Only the point or a 7 count when trying to get a point.

1. Shoot craps 36 times. Record the outcomes of the games in the table below.

Game #	Initial Roll	Initial Result	Final Result	# of Rolls
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				

Game #	Initial Roll	Initial Result	Final Result	# of Rolls
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				

2. Create a marginal distribution for the initial roll of the dice.

Roll	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Freq											
%											

3. Create a marginal distribution for the result of the initial roll of the dice.

Initial Result	**Win**	**Lose**	**Point**
Frequency			
Percent			

4. Create a marginal distribution for the final result of game.

Final Result	**Win**	**Lose**
Frequency		
Percent		

5. Summarize the **number of rolls** that it took to play a game.

Sum	Mean	Median	St. Dev	Variance

6. Make a histogram for the number of rolls that it took to play a game. Describe the shape of the histogram (you do not need to copy it down or print it out).

7. Collect the total number of rolls for 36 games from each of the teams (including your own) and record below.

8. Use the data in question 7 to find the average number of rolls for the entire class (remember that each total in the table above represents 36 games, not 1).

9. Upper level mathematics can be used to determine the actual marginal distribution for the final result of a game of craps is that you will win 49.29% of the time and lose 50.71% of the time. Look at the results and compare them to your results in question 4. Talk about how close your results are to the actual values.

10. The average length of a game (found using upper level mathematics) is 3.37575... rolls. Compare this result to the your results from question 5 and the classes' results from question 8. Who is closer?