Name: _____

**Due:** Wednesday, 2/27 end of 1st half of class

Lab #4 – M200 Sp13

***The Back Story:*** *In a school of 171 students,* ***every*** *student was asked if they were comfortable or not in the desks. It was found that 92 out of these 171 students were comfortable. This constitutes our* ***population****. From this population, 20 simple random samples of 5 students were taken and the number of students that were comfortable were noted (consider this like the coin tossing that we did in class). The probability distribution function that you see below was created from this sample. The random variable Y = the number of yes responses in a sample of 5. You will be investigating how well it conforms to the population through this lab.*

| Y = y | P(Y = y) | y • P(y) | $y^2$ • P(y) |
|---|---|---|---|
| 0 | 0.0333 | | |
| 1 | 0.200 | | |
| 2 | 0.2333 | | |
| 3 | 0.2000 | | |
| 4 | 0.300 | | |
| 5 | 0.0333 | | |

***Instructions:*** *The following questions 1-5 will be in reference to this pdf representing a sample.*

1. In the above table fill in the boxes in the last two columns. The results will be used to compute the answers to questions 2 & 3.

2. **Using the pdf** given above find the mean. Notate it correctly. Show all work.

3. **Using the pdf** given above find the variance and then use it to find the standard deviation. Notate correctly. Show all work.

4. **Using the pdf**, find the probability that fewer than 3 students in a sample of five answered yes. Show your work. Use correct notation. Round the probability correctly.

5. Using the **pdf and a complement**, find the probability that at least 3 students in a sample of five answered yes. Show your work. Use correct notation. Round the probability correctly.

***Instructions:*** *The following questions 6-11 will be in reference to population.*

6. List the 4 characteristics of a binomially distributed random variable and state how they are demonstrated by this experiment. *Hint: See page 6 of my Ch. 5 notes.*

7. What is the probability that a student is comfortable in the population? Use correct notation. Round the probability correctly. *Hint: See above Back Story and think relative frequency probability.*

8. Given that X = the # of yeses (theoretically) in a sample of 5, is a binomially distributed random variable, as shown by question 6, with the probability of a success equivalent to the answer in question 7, **use the formula for the mean, variance and standard deviation of a binomially distributed random variable** to find the mean and variance for a sample of 5. Show your work.

9. Given that X = the # of yeses (theoretically) in a sample of 5, is a binomially distributed random variable, as shown by question 6, with the probability of a success equivalent to the answer in question 7, **use the binomial formula** (show plug in to the formula, but you may give your answer using your calculator's distribution menu), to find the probability of getting **exactly** 2 yeses in a sample of 5. Use correct notation. Round the probability correctly.

10. Find $P(X \geq 3)$ using your calculator's distribution menu. You must write down binom___(___, ____, ____ and fill in the blanks to show your work.

11. Find the theoretical probability, using your calculator's distributions menu, that in a sample of 5 there will be at most 2 yes answer. Use correct notation. Round the probability correctly. You must write down binom___(___, ____, ____ and fill in the blanks to show your work.