

Name:

STAT 231–HW 3

Due date:09/19/19 (in class)

1. Chapter 3: Problem 16 (only part (a))
2. Chapter 3: Problem 23
3. Chapter 3: Problem 30
4. Chapter 3: Problem 36
5. Chapter 3: Problem 48
6. Chapter 3: Problem 52
7. Chapter 3: Problem 80
8. Refer to problem 49 in Chapter 3 of Devore's textbook. Suppose that a shipment of goblets arrives and the inspector is interested in knowing how many goblets will need to be inspected until the first faulty one is found. Denote this random variable as Y .
 - (a) What is the distribution for Y ? Also state the value of the parameter.
 - (b) Find the probability that the fifth goblet checked is the first defective.
 - (c) Find the probability that the inspector will have to check 5 or more goblets in order to find the first defective.
 - (d) What is the expected number of goblets the inspector will have to check in order to find the first defective? What is the variance in the number of goblets inspected until a defective is found?
9. Following the instructions given on the next page concerning JMP, use **JMP to graph the probability density functions** for each of the following random variables and, for each distributional case, give the most likely value of each random variable.
 - (a) Binomial distributions with $n = 5$ and $p = 0.2$, $p = 0.6$, and $p = 0.9$.
 - (b) Geometric distributions with $p = 0.4$ and $p = 0.8$. Use $x = 1, \dots, 12$.
 - (c) Poisson distributions with $\lambda = 0.7$ and $\lambda = 2.5$. Use $x = 0, \dots, 10$
10. Following the instructions given on the next page concerning JMP, use JMP to simulate 5000 values from each of the following distributions. Create histograms of the simulated values and indicate (YES or NO) whether these histograms essentially match probability density functions for these random variables in the previous problem.
 - (a) Binomial distribution with $n = 5$ and $p = 0.2$.
 - (b) Geometric distribution with $p = 0.4$.
 - (c) Poisson distribution with $\lambda = 2.5$.

Be sure to include JMP output for Problems 10 & 11

Instructions for graphing pmf in JMP (Problem 10)

1. Create a new datatable in JMP (e.g., use icon in the upper left corner).
2. Change the name of Column 1 to x by double-clicking on the heading “Column 1”.
3. In this column, enter the values that the random variable can take on.
4. Create a new column by double clicking on the blank heading space. Label this column “pmf”
5. Right click on the heading for the new “pmf” column and choose formula.
6. For a binomial or Poisson random variable, choose the “Discrete Probability” menu. Choose the appropriate kind of probability (e.g., “Binomial Probability” or “Poisson Probability”) and enter the parameters from the problem. Also, enter x in place of k to get the values we entered in the first column called x . For example, Binomial Probability(0.1, 5, x) or Poisson Probability(3.87, x). Click OK. Note: For a geometric pmf, there is no built in formula, so we can enter the pmf ourselves. Double click on the formula box with the text “no formula” and enter the appropriate pmf function, for example $0.2^{(x-1)} * 0.8$ for $p = 0.8$.
7. To create a graph, click on the “Graph” menu and choose “Graph Builder”.
8. Drag x to the box under the x axis and the column containing your probabilities to the spot in the y axis. Click on the bar graph icon at the top of the graph window.

Instructions for simulating in JMP (Problem 11)

1. Create a new datatable in JMP.
2. Click the “Rows” menu (e.g., a red down arrow in table) and choose “Add Rows”. Add the number of rows corresponding to the number of values you wish to simulate.
3. Create a new column 2 by double clicking on the blank heading space. Then right click on the title for column 2 and choose “formula”.
4. Choose the “Random” menu.
5. Choose the distribution you wish to generate from and enter the desired parameter values, i.e. Random Binomial(5, 0.1). Click OK.
6. The column 2 should now contain the values for each simulation. Use Analyze \rightarrow Distribution to create a histogram from the column 2 values. (In the histogram, you can select the “red down arrow” for Column 2 to adjust the histogram appearance: firstly de-select “Outlier Box Plot” if necessary, and secondly under “Histogram Options”, deselect “Vertical” if necessary and select “Prob Axis”).