

# Math 218 - Minitab

## Homework #1

The space and memory limitations of the student versions of Minitab may be avoided by completing this assignment in the Math Lab in KAP.

1. Using the Minitab command **calc->random data->normal**, simulate 2,000 random normal variables with mean 8 and standard deviation 2. Create a histogram (**graph->histogram**) which shows the data in the range between 0 and 15, with class intervals of length 0.5 (remember to select "Cutpoint" for "Type of Intervals"). Title this histogram (**annotation->title**) "2,000 Normal Variables." *Make sure that your name and SSN are also included in the histogram title on this and all the other histograms you generate for this exercise.*

2. By coding the data (**manip->code->numeric to numeric**, substituting the values from the range (-100, 9.5) by 0, and those in the range [9.5, 100) by 1) and then using either **stat->tables->tally** or **calc->column Statistics->sum**, find out how many of your 2,000 variables are greater than 9.5, and estimate the probability that a single normal variable with mean 8 and standard deviation 2 is above 9.5. *Write this estimate by hand on your histogram, and show on your histogram which area is being used as your estimate.*

3. Simulate 2,000 sample means, each made by taking the average of 20 normal variables with mean 8 and standard deviation 2. If you fill columns C1-C20 with 2,000 normal variables as in 1, you can use **calc->row statistics** and then select **mean**, make the input variables C1-C20, and store the 2,000 sample means in Column 21. As in 1, make a histogram of these sample means in the range 0 to 15, titled "2,000 normal sample means." By coding the data, estimate the probability that a sample mean exceeds 9.5 and write this estimate by hand on your histogram. Show which area of the histogram is being used as your estimate.

4. For which histogram is the estimate of the probability of exceeding 9.5 the smallest? What is it about the shape of that histogram which makes this probability small?

5. You may wish to restart Minitab now. Using the first four unique digits of your SSN, create a discrete distribution which puts probability .2 on the first digit, .3 on the

second digit, .1 on the third digit, and .4 on the 4th digit. (If your SSN is 667 75 6449 then your first 4 unique digits are 6754). Do this by placing your four unique values in C1, and the associated probabilities in C2. Simulate 2,000 observations from this distribution using **calc->random data->discrete** and make a histogram titled "2,000 observations for a discrete distribution." If you did not restart Minitab, you might want to use Options to reset the class intervals to automatic.

6. Simulate 2,000 sample means each of which is an average of 25 variables having the discrete distribution created using your SSN. Make a histogram titled "2,000 sample means of a discrete distribution." Do the histograms (in part 5) for the discrete distribution resemble the normal curve? What about the sample averages from that distribution?

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