Math 160/263 – Assignment # 2

Title: Distributions in Minitab

Worksheet: None

The purpose of this assignment is to familiarize you with Minitab's capabilities to display and compute statistics for discrete finite and continuous distributions. The assignment uses material from the Minitab Handbook, Chapters 3 and 12.

Using Minitab with a Discrete Distribution

In class you have met the Binomial Distribution, with parameters n, the number of trials, and p the fixed probability of success on any given trial. You will use Minitab to create a sample from $B(100, 0.15)$, plot it and compare the numerical characteristics of the sample with the known characteristics of the distribution.

1. Using the **Calc** $\Rightarrow$ **Random Data** $\Rightarrow$ **Binomial** command create a sample of size 200 from the $B(100, 0.15)$ distribution. Put 200 in "Number of rows to generate" and enter the n and p in the "Number of Trials" and " Event Probability" windows. Put the sample in the first column in your worksheet. Include the first 5 rows of your sample in your report.

2. Using the **Graph** $\Rightarrow$ **Stem-and-Leaf** command create a stem and leaf plot of your data. Select "Increment" of 2 to make a nice looking plot. Briefly describe the characteristics of this distribution in words. Minitab counts in from both sides until it finds the stem that contains the median. This stem has the number of leaves in it in parentheses. This is what the far left column of numbers means.

3. Using the **Stat** $\Rightarrow$ **Basic Statistics** $\Rightarrow$ **Display Descriptive Statistics** command, compute the five number summary, the mean and the standard deviation of your sample. In the **Display Descriptive Statistics** dialog box you may have to select the **Statistics** button and choose the statistics that you want Minitab to compute. Compare the mean and the standard deviation from your sample with the theoretical ones for a $B(100, 0.15)$ distribution.

Using Minitab with a Continuous Distribution

Minitab will also compute probabilities from continuous distributions. A study of serum cholesterol levels in psychiatric patients of a maximum security forensic hospital revealed that the the cholesterol level is approximately

normally distributed with a mean of 208 milligrams per deciliter (mg/dL) and a standard deviation of 25 mg/dL(*Journal of Behaviorial Medicine*, February, 1995. Prior research has shown that patients who exhibit violent behavior have a cholesterol level below 200 mg/dL.

4. Find the following probabilities using the **Calc** ⇒ **Probability Distributions** ⇒ **Normal** command.

a. The probability that a randomly selected patient has a cholesterol level below 158 mg/dL. Select **Cumulative probability** and enter the mean and standard deviation in the windows provided, the put 158 in the "Input constant" window.

b. The probability that a randomly selected patient has a cholesterol level between 158 mg/dL and 258 mg/dL. Repeat a. with 258 and compute the difference.

c. Find the probability that a randomly selected patient exhibits violent behavior.

d. Find the third quartile of the distribution of serum cholesterol levels in these patients. The third quartile has .75 of the patients' cholesterol levels below it. In the same dialog window click on **Inverse cumulative probability** and enter 0.75 in the "Input constant" window.

Saving and Editing your Report:

5. Save the ReportPad (use **File** ⇒ Save as as a ".rtf" file. This stands for "rich text format" and is readable by Microsoft Word). Open the report in Microsoft Word and edit it to produce a report with a professional appearance. Ensure the title says what the report contains. Print out the finished product for your instructor. You should do this each time, and these instructions will not be repeated in future Minitab Assignments.