Chapter 1: (10 points) In its most recently published *Fact Book and Outcomes Report 2014-2015*, MCC tracks the number of credits that all of its students take. Here are the results from Fall Semester 2010 through Fall Semester 2014:

HEAD COUNT BY CREDIT LOAD STATUS

	FA10	FA11	FA12	FA13	FA14
1-4 Credits	1730	1744	1578	1690	1576
5-8 Credits	2119	2241	2347	2343	2153
9-11 Credits	1671	1921	1957	2050	1939
12-14 Credits	3602	3433	3239	3051	2600
15+ Credits	588	501	543	568	937
Total	**9710**	**9840**	**9664**	**9702**	**9205**

Source: Banner Student Information System, End of Term Data

(*MCC Fact Book and Outcomes Report 2014-2015*, page 90)

1. To be a full-time student, a student needs to take 12 or more credits. Calculate each of the following. Round to the nearest whole percent.
   a. In FA 14 (Fall 2014), what percent of MCC students were full-time students?
   b. In FA 14 (Fall 2014), what percent of MCC students were part-time students?
   c. Are the numbers in the table above statistics or parameters? Explain.

2. Suppose that you have been asked to conduct a survey of 500 MCC students to estimate the percent of full-time students and percent of part-time students at MCC this semester. Of course, you want the sample to be representative of the MCC student population. If you had access to MCC's student enrollment information, describe two possible sampling methods that could be used to create a *representative* sample of 500 students. For each sampling method, be sure to name the sampling method used and detail how it would be carried out.

Chapter 2 and 3: (20 points) Use the Data Set OSCAR: Ages of Oscar Winners- Best Actresses set to solve the following problems:

1. Use your graphing calculator or Excel to find the following statistics values- mean, median, mode, range, and the standard deviation for the data set.
2. Organize the data set in a frequency table using bins with width 10, starting from 20-29, 30-39 and so on. Include columns for the relative and cumulative frequency.
3. Construct a histogram based on the table of step 2. Analyze the distribution curve- number of peaks, the symmetry, and variation.
4. Use your graphing calculator or Excel to find the 5 - Number Summary of the data set. Construct a boxplot.
5. Identify the data value of the 18^{th} percentile $-P_{18}$. Find the percentile for the value 40.

Chapter 4: (10 points) Classic Birthday Problem: Find the probability that among 25 randomly selected people, at least two have the same birthday.

To solve this problem, use a simulation. A simulation of a procedure is a process that behaves the same way as the procedure so that similar results are produced. For the above classic birthday problem, a simulation begins generating random birthdays. Use https://www.random.org/integers to generate 25 random birthdays (you can think of each day of the year as a number between 1 and 365). Are any two of the simulated birthdays the same? Repeat this process as least 20 times. What is the probability that in a group of 25 random people two have the same birthday? *You must include all your randomly generated dates to receive credit for this problem. Do not calculate the theoretical probability, you will not receive credit. The probability will be based on your simulated results.*

Chapter 3 and 5: (10 points) The analysis of the last digits of data can sometimes reveal whether the data have been collected through actual measurements or reported by subjects. Find a collection of data on the internet (example: lengths of rivers in the world, but come up with your own idea – at least 30 data values) and analyze the distribution of the last digits using a frequency table or histogram. Use this to determine whether you believe the values were obtained through actual measurements. *You must include your data set and a distribution of the last digits compared to the expected distribution to receive credit for this problem.*

Chapter 5 and 6: (10 points) Use a coin or https://www.random.org/integers/ to simulate births. You should simulate 100 births and report the number of girls and the number of boys in your simulation. Let n = the total number of births simulated and x= number of girls. Compute the mean and standard deviation for the number of girls in n births. Is the simulated result unusual? Why or why not? *You must include all your randomly generated values to receive credit for this problem.*

Chapter 7: (10 points) You have been hired by a college foundation to conduct a survey of graduates.

a) If you want to estimate the percentage of graduates who made a donation to the college after graduation, how many graduates must you survey if you want 99% confidence that your percentage has a margin of error of 5 percentage point?

b) If you want to estimate the mean amount of charitable contributions made by graduates, how may graduates must you survey if you want 99% confidence that your sample mean is in error by no more than $50? (Based on result from a pilot study, assume that the standard deviation of donations by graduates is $337.)

Chapter 8: (10 points) Pennsylvania Lottery. In Pennsylvania Match 6 Lottery, six numbers between 1 and 49 are randomly drawn. Use https://www.random.org/integers/ to generate 100 random numbers between 1 and 49 and calculate the mean and the standard deviation of your sample. Use a 0.01 significance level to test the claim that the sample is selected from a population with a mean equal to 25, which is the mean of the population of all drawn numbers. *You must include all your randomly generated values to receive credit for this problem.*

Chapter 10: (20 points) Use the Data Set BEARS (measurements from anesthetized wild bears) to:

1. Create two different scatter plots using your graphing calculator or Excel.
   a) Graph1: Age (x) and Weight (y)
   b) Graph2: Chest (x) and Weight (y)
2. For both scatter plots write up an analysis of all the information that you learn from the picture. At a minimum your analysis should answer the following:
   - Is there a correlation? Why?
   - If there appears to be a correlation, describe the correlation.
   - State the Correlation Coefficient (R), R^2, and the equation of the regression line. Discuss the "fit" of the regression line to the data.
3. Answer all of the following questions.
   a) Based on your analysis in step 2, do you think it is possible to infer a bear's weight from its age, or bear's chest from its weight? Explain your answer.
   b) Using the relationships that you calculated, determine the approximate age and chest of a bear with the following weights:
   170 lb 70 lb 105 lb
   c) Using the relationship that you calculated, determine the approximate weight of a bear with
   age 56 age 101 chest 30.0 chest 53.5