

DUE: ALL CLASSES- WEDNESDAY, APRIL 1 AT MIDNIGHT

Again, from now on, copy *all output* you generate from StatCrunch into your lab report unless otherwise directed.

Note that your free responses are generally worth more points than StatCrunch output.

#1) For this problem, you'll work with the binomial distribution.

At a certain university, 40% of students enrolled in an introductory statistics class are freshmen.

Suppose 12 students enrolled in an introductory statistics class are randomly selected.

- What is the fixed number of trials, n ? What is the success probability, p ?
- To find the probability that exactly 6 of these students enrolled in an introductory statistics class are freshmen in StatCrunch, go to **STAT, CALCULATORS, BINOMIAL**. Type in the fixed number of trials, n and the success probability, p . Choose the appropriate equal sign/inequality from the drop-down box and enter X according to the question. **COMPUTE**.
- Find the probability that at most 6 of these students enrolled in an introductory statistics class are freshmen. In StatCrunch, adjust your entries as needed from part b.
- Find the mean and standard deviation of the number of students out of 12 enrolled in an introductory statistics class who are freshmen. Not a StatCrunch exercise. Do not round the mean. Round the standard deviation to one decimal place. It's always wise to include a formula if applicable, so if you calculate incorrectly, at least I'll know you knew what to use. You can express formulas in words, too.

#2) This is an example of what your instructor calls "a generic discrete probability distribution".

A factory manager collected data on B , the number of equipment breakdowns on a given day and derived the following probability distribution.

B	0	1	2
$P(B=b)$	0.80	0.15	0.05

- To find the expected number of equipment breakdowns on a given day, type the values of the random variable in one column in StatCrunch, the corresponding probabilities in another. Click **STAT, CALCULATORS, CUSTOM**. Choose the location of the random variable under "Values in" and the location of the probabilities under "Weights in". **COMPUTE**.
- Based on your output from part a, what is the expected number of equipment breakdowns on a given day? Recall that the expected value of a discrete probability distribution is the same as the mean.
- Interpret your answer to part b. Don't say how you calculated it, I just gave you directions how. Tell me what it tells YOU!!

#3) For this problem, you'll work with the normal distribution.

Open the StatCrunch website, search for and load data "PrimaryBiliaryCirrhosis.xlsx" that was last edited on November 27, 2018. Primary biliary cirrhosis is an autoimmune disease that slowly destroys the liver. This data was collected from a sample of 312 patients who were being treated for this disease.

- a) To graph a normal probability plot for the age of these patients, click **GRAPH, QQ PLOT**. Select "Age (years)" and **COMPUTE**.
- b) *According to the normal probability plot*, are the ages normally distributed? Yes or no. Why or why not? Be specific.
- c) Assume the mean age of patients is 50 years with a standard deviation of 8 years. Find the probability that a randomly selected patient is at most 43 years old. Click **STAT, CALCULATORS, NORMAL**. Type in the given mean and standard deviation, select the appropriate inequality and type in the X according to the problem. **COMPUTE**.
- d) Find the probability that a randomly selected patient is between 52 and 60 years old. To do so, click **BETWEEN** at the top of the normal calculator.
- e) Suppose a sample of $n = 25$ patients is selected. Describe the distribution of $\bar{x}$ for a random sample of 25 patients, that is its shape, mean, and standard deviation. **You must justify how you know the shape**, which is one of your answers to a previous part of this problem. Finding the mean and standard deviation is not a StatCrunch exercise.
- f) Use the normal calculator and your answers to part f to find the probability that the mean age of a sample of 25 patients is at least 54 years old.

#4) For this problem, you'll work with the Poisson distribution.

Suppose a student receives texts at a rate of 10.5 per hour.

- a) Find the mean, λ for a two-hour interval. (Hint: the interval, t is based on two units of one hour)
- b) To find the probability that this student receives at least 12 texts in two hours, open StatCrunch and click **STAT, CALCULATORS, POISSON**. Type in the value of the mean, select the correct inequality and X according to the problem. **COMPUTE**.
- c) Adjust the Poisson calculator to find the probability that the student receives less than 5 texts in two hours.