Math 247: Review for Test 1 (with suggested review problems)

The test will have two parts, an In-Class Test and a Take-Home Test.

- For the In-Class Test, you may have a ***3x5 card*** with formulas and notes on it.
- You will also need a ***calculator*** (any type is fine). You may not use your phone as a calculator.
- StatCrunch will not be used on the In-Class Test. It will be used on the Take-Home Test.

For review: Review your homework and notes then do the review problems below. . Finally,go to the www.wrightmath.info and test your knowledge by using the old exams as practice tests. Fill out your 3x5 card with relevant formulas as you go through this review.

Chapter 1 Review **Read:** Chapter 1 **Key Terms**, **Summary** (page 26)

Do: Review Exercises , page 32: 54, 57, 59, 61

Even answers: #54: No, this was an observational study. There is no mention of random assignment. We cannot conclude that coffee drinking CAUSES a reduction in prostate cancer, only that coffee is ASSOCIATED with a reduction.

Chapter 2 Review **Read:** Chapter 2 **Key Terms**, **Summary** (page 62)

Do: Review Exercises, page 73: 55, 57, 59, 60, 61, 67

Even answers: #60: The typical percentage of students with jobs for the top schools is higher than for those at the bottom schools. Both distributions are skewed left. There is much more variation in employment for the students in the bottom schools.

Chapter 3 Review **Read:** Chapter 3 **Key Terms**, **Summary**, (page 119)

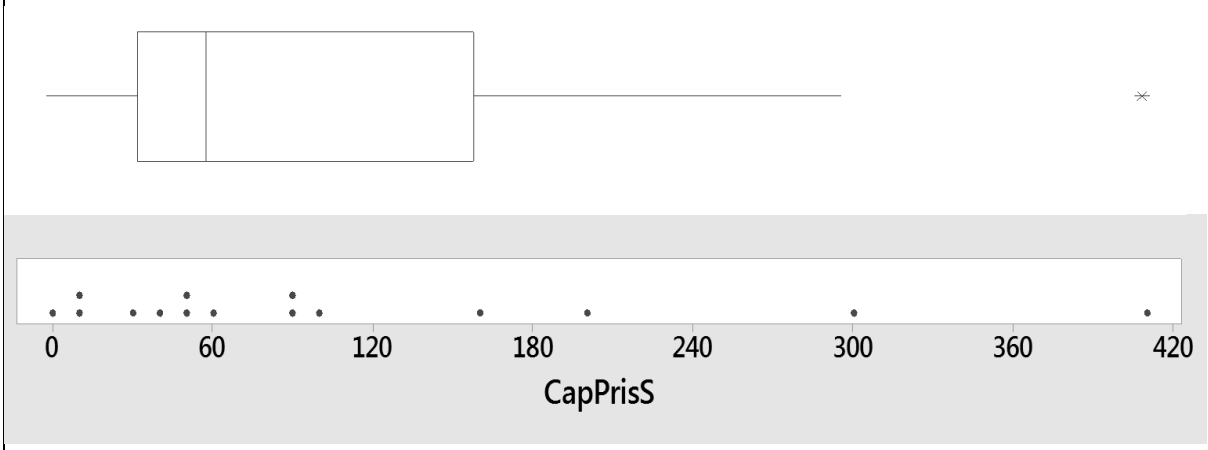
Do: Review Exercises, page 130: 67, 74ab, 87, 89, 91, 93

(note: For #67 use the StaCrunch result of descriptive statistics and graphs given below (you don't have to find the values yourself). The answers are also given, based on the StatCrunch values.

Even answers:

#67: **Descriptive Statistics: CapPrisS**

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	Maximum
CapPrisS	15	0	106.2	30.3	117.3	0.0	34.0	60.0	161.0	413.0



(a) The median number of prisoners is 60.
(b) Q1 = 34, Q3 = 161, IQR = 161 – 34 = 127
(c) The mean number of prisoners is 106.2 (about 106)
(d) The mean is so much larger because the data is skewed right with a large outlier. We can see the skewing from the boxplot and from the dotplot.

#74: (a) The distribution is bimodal; (b) The two modes either represent men and women, or represent elite runners and casual runners.

Chapter 1 Concepts to study:

- Identify the Research Question in a study.
- Identify the sample and the (implied) population in a study.
- Determine the variables in a study
    - Distinguish between types of variables: categorical/qualitative, numerical/quantitative.
- Know the importance of a control group for comparison and identify whether there was a control group for comparison in a given study.
- Identify what variables could cause confounding.
    - Explain how a confounding variable links the independent and dependent variables.
- Distinguish between types of studies: **observational** vs. **randomized controlled experiments**.
    - Know that cause-and-effect can only be determined from controlled experiments.
- Identify "treatment" and "response" variables in a study.
    - Know other names for "treatment" ("independent" variable or "factor")
    - Know other names for "response ("dependent" variable or "outcome")
- Identify "blind" and "double blind" experiments.
- Describe how to set up (know the elements of) a good controlled experiment (random sample, random assignment, double blind, placebo or control group for comparison)

Chapter 2 Concepts to study:

- Construct a dotplot by hand.
- Interpret a histogram: number of bins, bin width, frequency, relative frequency
- Describe a distribution in terms of
    - Shape (unimodal or bimodal, symmetry/skewness),
    - Center ("typical value")
    - Variability (how spread out the data is from the center)
- Given two dotplots or histograms, compare the distributions in terms of center and variability.

- Know that if the y-axis doesn't begin at zero, then a graph is potentially misleading.

Chapter 3 Concepts to study:

- Know what all the symbols and variables we've used in this section represent (describe in words)
    - $\bar{x}$, x, $\sum$, n, s, z
- Know the ways of measuring the center of a data set: Mean and Median
    - Find the mean, median, and mode of a set of data **by hand**. **(Review notes!)**
- Know the ways of measuring variability of a data set:
    - **SD**: Find the standard deviation, **by hand**, of a small set of data. **(Review notes!)**
    - **IQR**: find IQR of a data set
- Find the quartiles of a data set. Know what each quartile tells you about the data.
- Find the upper and lower outlier limits (fences) and use to identify outliers in a data set.
- Know what the Five Number Summary is and use it to construct a Boxplot, find IQR and outlier limits.
- Use a Boxplot to determine and compare
    - center of the data (the middle bar is the median)
    - symmetry and skewness (box is longer on right for right skew, longer on left for left skew)
    - variability: IQR is the length of the box, longer box means more variation.
    - outliers
- Know what "**resistance**" is and which statistics are resistant (median, IQR) and which are not (mean, standard deviation).
- Know the effect that skewing or outliers have on the mean vs. the median.