

## MA 111 Review for Exam 6: Solutions

Exam 6 (given in class on Thursday, December 3) will cover Unit 6: Descriptive Statistics. Use Chapter 14 in the textbook as a study tool.

You should be familiar with the following key ideas:

- Understand how to make and/or interpret the following graphical representations of data:
  - frequency table
  - bar graph
  - histogram
  - pictogram
  - pie chart
- Remember the differences between continuous and discrete variables, and between numerical and categorical variables. Understand which of the above graph types are best suited for these different types of variables.
- Be able to critique a graph. What are some common ways that graphs can be made so they mislead the viewer?
- Know the definition of the mean (or average) and how to calculate it for a given data set.
- Know the definition of the  $p$ th percentile and how to find it for a data set.
- Understand the meanings of median, first quartile, and third quartile:
  - The first quartile  $Q_1$  is the 25th percentile.
  - The median  $M$  is the 50th percentile.
  - The third quartile  $Q_3$  is the 75th percentile.
- Be able to make and/or interpret a box-and-whisker plot.
- Know the definition of the range and the interquartile range.

## Practice Problems

Use the odd exercises on pages 545-554 of the text to supplement these. You can check your answers in the back of the book.

1. Suppose you are given the following data table:

red	3
orange	1
yellow	4
green	3
blue	7
purple	2

- (a) Choose a graphical representation and use it to represent the data in the table.  
You could make a bar graph or a pie chart. A pictogram might also work, maybe with crayons making up the bars of the bar graph.

Here's the bar graph:

- (b) Other than the graph you just chose, name another type of graph that would be appropriate for representing this data.

As above, a bar graph, pie chart, or pictogram is appropriate

- (c) Name a type of graph that would be inappropriate for representing this type of data, and explain why.

A histogram would be inappropriate, because the variable is not numerical and continuous. Remember that histograms are best for continuous variables like height, weight, etc.

2. Suppose you want to make a pie chart of the age of students in MA111. If 39% of the students are 19 years old, how big would the corresponding slice of the pie be? Calculate the size of the central angle of the slice.

The central angle would be  $39 \cdot 3.6^\circ = 140.4^\circ$ .

3. Consider the following two data sets of exam scores for two different sections of a course:

Class A = {40, 52, 65, 66, 68, 71, 72, 73, 77, 77, 78, 78, 80, 81, 81, 83, 86, 87, 92, 99}

Class B = {55, 65, 66, 68, 72, 72, 73, 74, 76, 78, 79, 79, 80, 81, 85, 85, 85, 87, 90, 95}

(a) Find the median, first quartile  $Q_1$  and third quartile  $Q_3$  for each class.

Both classes have  $N = 20$  students. Notice the lists are already sorted.

Class A: The median is the average of the 10th and 11th values:  $M = 77.5$ .

The locator for  $Q_1$  is  $L = .25(20) = 5$ . So  $Q_1$  is the average of the 5th and 6th values:  $Q_1 = 69.5$ .

The locator for  $Q_3$  is  $L = .75(20) = 15$ . So  $Q_3$  is the average of the 15th and 16th values:  $Q_3 = 82$ .

For Class B, the locators are all the same because  $N$  is the same.

So  $M = 78.5$ ,  $Q_1 = 72$ , and  $Q_3 = 85$ .

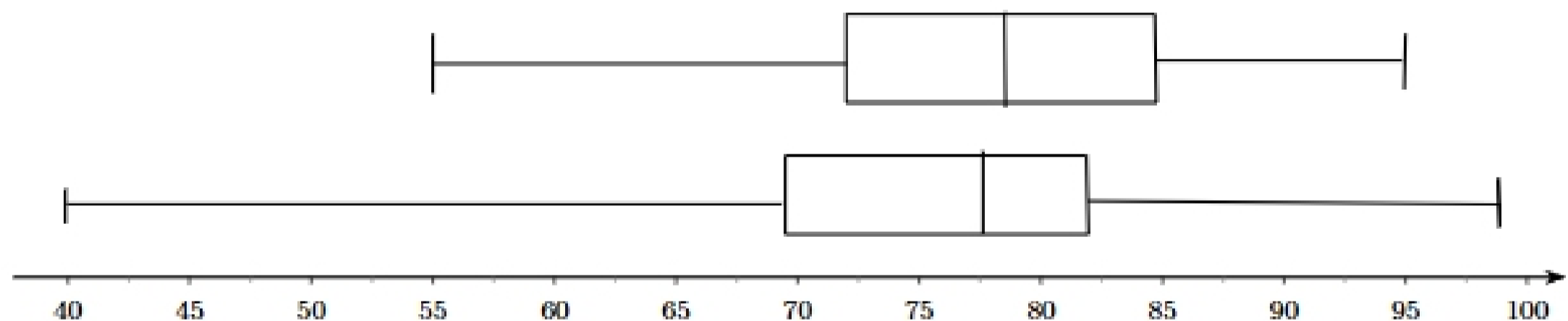
(b) The professor wants to recommend the top 10% of each class for a scholarship. How many students will she recommend? (Remember, she will recommend students from *each* class).

The top 10% of each class is found by computing the 90th percentile.

So  $L = .9(20) = 18$ . The 90th percentile is the average of the 18th and 19th values of each class.

So there are two students in Class A (they got a 92 and a 99), and two students in Class B (they got a 90 and a 95). Overall, the professor will recommend 4 students.

(c) Create box and whisker plots for both classes on a single axis.



4. Mike's average on the first five exams is 88. What must he earn on the next exam to raise his exam average to 90?

Since the first five exams averaged to be 88, the sum of all of those five exam scores was  $88(5) = 440$ .