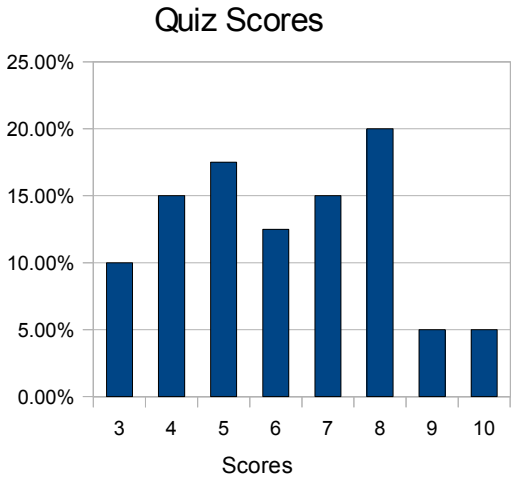
Math 105 - Math in Modern Society

Chapter 14 Solutions

Oct. 8, 2010

12. A relative frequency bar graph is one that uses percentages instead of raw frequencies. So you want to calculate what *percentage* of the data falls into each category (or in this case, earned each score).



30. (a) There are a total of 79 firefighters in the Cleansburg fire department. To calculate the average (or mean) age, we need to not forget to multiply each age by the number of people who are that age:

$$\frac{2(25) + 7(27) + 6(28) + 9(29) + 15(30) + 12(31) + 9(32) + 9(33) + 6(37) + 4(39)}{79} = 31.05.$$

(b) Since there are 79 firefighters, the median age will be the 40th data point from the bottom. So the median age is 31.

37. (a) The first quartile of the data set is the 25th percentile of the data set. We can find this as follows:

$$\frac{25}{100} \times 79 = 19.75,$$

so we round up to say that the first quartile is the 20th data point from the bottom. This value is $Q_1 = 29$.

(b) The third quartile of the data set is the 75th percentile of the data set. We can find this as follows:

$$\frac{75}{100} \times 79 = 59.25,$$

so we round up to say that the third quartile is the 60th data point from the bottom. This value is $Q_3 = 32$.

(c) We can find the 90th percentile of the data as follows

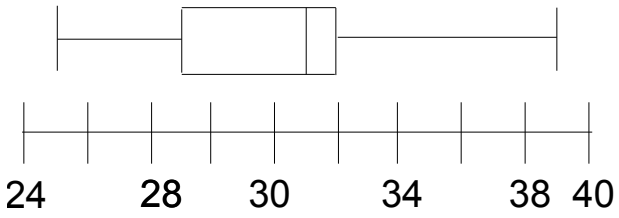
$$\frac{90}{100} \times 79 = 71.1,$$

so we round up to say that the 90th percentile is the 72nd data point from the bottom. This value is 37.

43. Since we already know the median and the first and third quartiles, we only need to identify the minimum value as 25 and the maximum value as 39. The five-number summary is

$$\{25, 29, 31, 32, 39\}.$$

The box plot of this data looks like



Notice that the scale **separate** from the actual box plot. Also, you box plot should have this shape.

69. (a) An example of ten numbers with an average less than the median is:

$$1 \quad 1 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10$$

The median is 5.5 and the average (mean) is 5.4.

(b) An example of ten numbers with an average greater than than the median is:

$$1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 10 \quad 10$$

The median is still 5.5 and the average (mean) is 5.6.

(c) An example of ten numbers with an average smaller than than the first quartile is:

$$0 \quad 0 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1$$

The first quartile is 1 and the average (mean) is 0.8.

(d) An example of ten numbers with an average larger than than the third quartile is:

$$1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 25 \quad 25$$

The third quartile is 8 and the average (mean) is 8.6.