Math 140   Homework 1   Answers

1. Explain how a sample is related to a population.

   A sample is a sub-group of the population from which data is collected.

2. a. Explain what is meant by the distribution of a categorical variable.

   The distribution of a categorical variable lists all of the values the variable takes and how often it takes each of these values.

   b. List two ways that this distribution can be displayed visually.

   With a bar chart or a pie chart.

3. For each of the following variables, indicate whether it is a quantitative variable or a categorical variable.

   a. the color of a M&M candy     categorical
   b. the weight of an airplane   quantitative
   c. the life expectancy of a nation  quantitative
   d. how many miles a person walks in one day   quantitative
   e. the age of a mother when her first baby born   quantitative
   f. whether or not a student eats breakfast or doesn’t   categorical
   g. the length of a snake   quantitative
   h. whether or not a car has automatic transmission or manual transmission/stick shift   categorical
   i. the number of calories in a pint vanilla ice cream   quantitative
   j. whether or not a baby tests HIV-positive   categorical
   k. the running time of a Tom Cruise movie   quantitative
   l. whether or not a person has life insurance or does not have life insurance   categorical
   m. the diameter of a pizza   quantitative
   n. the number of dogs an animal shelter has   quantitative
   o. the height of a sequoia tree   quantitative
   p. the color of a bottle of wine   categorical
   q. the number of books a person owns   quantitative
   r. the race of a person   categorical

![Pie chart showing firearm types](chart.png)

- **a.** What is the variable described in the pie chart?
  
  *Type of firearm (gun).*

- **b.** Summarize what the pie chart shows.

  *Four different gun types are prevalent—rifles, shotguns, revolvers and semi-automatic pistols, with rifles being the most common. Handguns and long guns are much rarer.*

5. Consider the following bar graph: Pressure from schoolwork

![Bar graph](bar_graph.png)

- **a.** What is the variable described in the bar graph? *Amount of pressure from schoolwork*

- **b.** What percent of students feel no pressure from schoolwork? $3/22 = 13.63\%$

6. In 2007, 5488 people were killed while working. Here is a breakdown of causes: transportation: 2234; contact with objects or equipment: 916; assaults or violent acts: 839; falls: 835; exposure to harmful substances or harmful environment: 488; fires or explosions:151; others: 25. (The data are from the Bureau of Labor Statistics.) Construct a bar graph.
5. The graph below came from the USA Today Snapshots: Commuting Time.

List two things that are wrong with this graph.

(1) The lengths of the dotted lines are not proportional to the percentages. If they were, the line for 32% would be about three times as long as the line for 11% (since $32\% \approx 3 \times 11\%$) and the line for 50% would be between four and five times as long as the 11% line.

(2) The three percentages do not add up to 100% even though they include all possible commute times.