1) Identify each of the following variables as quantitative or qualitative. For each quantitative variable, identify whether it is continuous or discrete.

a) age  
b) favourite meal  
c) television viewing preferences  
d) volume of radio  
e) colour of hair  
f) fabric texture  
g) pH of water samples  
h) seating capacity  
i) grades  
j) paint colours

2) Identify the variables and their types, as well as the population for the following thesis questions. Also, would you collect a sample or conduct a census? Would each question require a cross-sectional study or a longitudinal study?

a) Is there a relationship between weather conditions and absenteeism in Grade 9 at your school?

b) Is there a profile that describes people who generally buy used cars in Canada?
c) Is there a relationship between the amount of television watched and the level of physical fitness among adult females?

d) Do Grade 9 students who regularly eat breakfast perform better academically?

e) Are teenage drivers who have been issued speeding tickets more likely to be males?

f) What home conditions influence school-aged children in selecting a future career?

g) When is the best time of day to find a parking space within 100 meters of the mall?

h) How much of their own money do students at your school spend on their clothes?
3) For each of the following scenarios,

   i) determine the population
   ii) identify the key variables for the study
   iii) state whether the data will be quantitative or qualitative
   iv) for the variables that are quantitative, state whether the data will be discrete or continuous
   v) should a census or a sample be used
   vi) would a cross-sectional or longitudinal study be most appropriate

a) You must get T-shirt sizes for the 42 members of your school’s environment club (26 are female).

b) You are to canvass 200 households to determine the level of support that each of the candidates in a local by-election has.

c) You are studying biological succession in what was 45 hectares of a farmer’s cornfield. You are trying to measure plant diversity by identifying the number of each species per hectare.
d) This summer, you have been hired to work with anthropologists from the Royal Ontario Museum. You are to gather data from the Aboriginal population on Manitoulin Island, Ojibways of Lake Huron, on how their family structures have changed in the last century.

e) You are collecting and analyzing suggestions for a new name for your school. Data must be gathered from present and former students, students in the feeder schools, past and present teachers and administrators, support staff, parents and guardians, as well as interested members of the community.

f) Your teacher has arranged your class in groups of three, and asked you to gather data, analyze them, and communicate whether teenagers today are economically worse off than teenagers were 20 years ago.
4) Create a suitable thesis question for the following studies. Be sure to clearly identify the population in your question.

a) Customers leaving a local grocery store are asked how much they spent and how often they buy groceries.

b) A furniture store wishes to use existing data to determine trends in consumer buying habits over the last five years.

5) Consider this thesis question: *In North America, do foreign cars depreciate in value faster than domestic cars?* Now answer the questions that follow:

a) What is the population?

b) What are the key variables that must be considered? Are these quantitative or qualitative?

c) Should a census or a sample be used to collect data?

d) Are the data continuous or discrete?

e) Is a cross-sectional or a longitudinal study more appropriate for drawing conclusions?
6) Explain the differences between each pair of terms.

a) population/sample

b) cross-sectional study/longitudinal study

c) quantitative variable/qualitative variable

d) discrete data/continuous data
Answers

1) a) quantitative, discrete variable (but can be continuous)  b) qualitative  c) qualitative  
d) quantitative, continuous  e) qualitative  f) qualitative  g) quantitative, continuous  
h) quantitative, discrete  i) quantitative, discrete  j) qualitative

2) a) Weather condition is a qualitative variable. Absenteeism is a quantitative and discrete (but can be continuous) variable. The population is grade 9 students in our school. Sample is collected. Longitudinal study is required.  
b) Profile is a qualitative variable. The population is people who buy used cars in Canada. Sample is collected. Cross-sectional study is required.  
c) Amount of television is a quantitative and discrete variable (measured in minutes). Physical fitness is a quantitative and continuous variable. The population is adult females. Sample is collected. Longitudinal (can be cross-sectional) study is required.  
d) Average number of breakfast meals eaten is a quantitative and discrete variable. Grades are a quantitative and continuous variable. The population is grade 9 students. Sample is collected. Longitudinal study is required.  
e) Number of female students with speeding tickets is a quantitative and discrete variable. Number of male students with speeding tickets is a quantitative and discrete variable. The population is teenagers who have been issued speeding tickets. Sample is collected. Cross-sectional study is required.  
f) Home condition is a qualitative variable. The population is school-aged children. Sample is collected. Cross-sectional (can be longitudinal) study is required.  
g) Time of day is a quantitative and discrete variable. Number of available parking spaces is a quantitative and discrete variable. The population is shoppers who drive to the local mall. Sample is collected. Longitudinal study is required.  
h) Amount of money spent on clothes is a quantitative and discrete variable. Amount of money students earn is a quantitative and discrete variable. The population is students at our school. Sample is collected. Cross-sectional study is required.

3)(a)(i) The population is members of school environment club. (ii),(iii),(iv) Quantity for each T-shirt is a quantitative and discrete variable. (v) census (vi) cross-sectional  
b)(i) The population is electors in a district. (ii),(iii) Level of support is a qualitative variable. (v) sample (vi) cross-sectional  
c)(i) The population is plants on 45 hectares of land. (ii), (iii), (iv) Plant species is a qualitative variable. Number of species per hectare is a quantitative and discrete variable. (v) census (vi) cross-sectional  
d)(i) The population is a native community on Manitoulin Island. (ii),(iii) Family structure during the last century is a qualitative variable. (v) sample (vi) longitudinal  
e)(i) The population is present and former staffs and students, parents and interested community members. (ii), (iii) New names for the school are qualitative variables. (v) sample (vi) cross-sectional  
f)(i) The population is teenagers today and 20 years ago. (ii), (iii) Economic situation of teenagers today is a qualitative variable. Economic situations of teenager 20 years ago are qualitative variables. (v) sample (vi) longitudinal

4) Answers may vary

5) (a) The population is cars in North America. (b) Rate of depreciation of foreign cars is a quantitative variable. Rate of depreciation of domestic cars is a quantitative variable. (c) A sample should be used. (d) The data are continuous. (e) Cross-sectional study is more appropriate for drawing conclusions.

6) (a) Population is the group being studied when sample is a selection of individual taken from the population. (b) Cross-sectional study is a study that considers individuals from different groups at the same time. Longitudinal study is a study of a single group (or sample) over a long period of time. (c) Both terms describe the characteristics of all data. Quantitative data are numerical and qualitative data are non-numerical. (d) Discrete data is data that can be described only using whole numbers. For example, number of vehicles is a discrete data. Continuous data is data that are measurable with real numbers.