6.1.1 For this problem the population is the somewhat imaginary concept of "all possible die rolls."

The sample should be representative if the die is shaken properly.

6.1.2 The population may be all television sets that are ready to be shipped during a certain period of time, although the representativeness of the sample depends on whether the television sets that are ready to be shipped on that Friday morning are in any way different from television sets that are ready to be shipped at other times.

6.1.3 Is the population all students? - or the general public? - or perhaps it should just be computing students at that college?

You have to consider whether the eye colors of computing students are representative of the eye colors of all students or of all people.

Perhaps eye colors are affected by race and the racial make-up of the class may not reflect that of the student body or the general public as a whole.

6.1.4 The population is all service times under certain conditions.

The conditions depend upon how representative the period between 2:00 and 3:00 on that Saturday afternoon is of other serving periods.

The service times would be expected to depend on how busy the restaurant is and on the number of servers available.

6.1.5 The population is all peach boxes received by the supermarket within the time period.

The random sampling within each day's shipment and the recording of an observation every day should ensure that the sample is reasonably representative.

6.1.6 The population is the number of calls received in each minute of every day during the period of investigation.

The spacing of the sampling times should ensure that the sample is representative.

6.1.7 The population may be all bricks shipped by that company, or just the bricks in that particular delivery.

The random selection of the sample should ensure that it is representative of that particular delivery of bricks.

However, that specific delivery of bricks may not be representative of all of the deliveries from that company.

6.1.8 The population is all car panels spray painted by the machine.

The selection method of the sample should ensure that it is representative.

6.1.9 The population is all plastic panels made by the machine.

If the 80 sample panels are selected in some random manner then they should be representative of the entire population.

6.1.10 A

6.1.11 B

6.2.3 The smallest observation 1.097 and the largest observation 1.303 both appear to be outliers.

6.2.4 The largest observation 66.00 can be considered to be an outlier.

In addition, the second largest observation 51 might also be considered to be an outlier.

6.2.5 There would appear to be no reason to doubt that the die is a fair one.

A test of the fairness of the die could be made using the methods presented in section 10.3.

6.2.6 It appears that worse grades are assigned less frequently than better grades.

6.2.7 The assignment "other" is employed considerably less frequently than blue, green, and brown, which are each about equally frequent.

6.2.8 The data set appears to be slightly positively skewed.

The observations 186, 177, 143, and 135 can all be considered to be outliers.

6.2.9 The observations 25 and 14 can be considered to be outliers.

6.2.10 The histogram is bimodal.

It may possibly be considered to be a mixture of two distributions corresponding to "busy" periods and "slow" periods.

6.2.11 The smallest observation 0.874 can be considered to be an outlier.

6.2.12 The largest observation 0.538 can be considered to be an outlier.

6.2.13 This is a negatively skewed data set.

The smallest observations 6.00 and 6.04 can be considered to be outliers, and possibly some of the other small observations may also be considered to be outliers.

6.2.14 A bar chart represents discrete or categorical data while a histogram represents continuous data.

6.2.15 B

6.2.16 C

6.2.17 C

Note: The sample statistics for the problems in this section depend upon whether any observations have been removed as outliers. To avoid confusion, the answers given here assume that **no** observations have been removed.

The trimmed means given here are those obtained by removing the largest 5% and the smallest 5% of the data observations.

6.3.1 The sample mean is $\bar{x} = 155.95$.
The sample median is 159.
The sample trimmed mean is 156.50.
The sample standard deviation is $s = 18.43$.
The upper sample quartile is 169.5.
The lower sample quartile is 143.25.

6.3.2 The sample mean is $\bar{x} = 1.2006$.
The sample median is 1.2010.
The sample trimmed mean is 1.2007.
The sample standard deviation is $s = 0.0291$.
The upper sample quartile is 1.2097.
The lower sample quartile is 1.1890.

6.3.3 The sample mean is $\bar{x} = 37.08$.
The sample median is 35.
The sample trimmed mean is 36.35.
The sample standard deviation is $s = 8.32$.
The upper sample quartile is 40.
The lower sample quartile is 33.5.

6.3.4 The sample mean is $\bar{x} = 3.567$.
The sample median is 3.5.
The sample trimmed mean is 3.574.
The sample standard deviation is $s = 1.767$.
The upper sample quartile is 5.
The lower sample quartile is 2.

6.3.5 The sample mean is $\bar{x} = 69.35$.
The sample median is 66.
The sample trimmed mean is 67.88.
The sample standard deviation is $s = 17.59$.
The upper sample quartile is 76.
The lower sample quartile is 61.

6.3.6 The sample mean is $\bar{x} = 3.291$.
The sample median is 2.
The sample trimmed mean is 2.755.
The sample standard deviation is $s = 3.794$.
The upper sample quartile is 4.
The lower sample quartile is 1.

6.3.7 The sample mean is $\bar{x} = 12.211$.
The sample median is 12.
The sample trimmed mean is 12.175.
The sample standard deviation is $s = 2.629$.
The upper sample quartile is 14.
The lower sample quartile is 10.

6.3.8 The sample mean is $\bar{x} = 1.1106$.
The sample median is 1.1102.
The sample trimmed mean is 1.1112.
The sample standard deviation is $s = 0.0530$.
The upper sample quartile is 1.1400.
The lower sample quartile is 1.0813.

6.3.9 The sample mean is $\bar{x} = 0.23181$.

The sample median is 0.220.

The sample trimmed mean is 0.22875.

The sample standard deviation is $s = 0.07016$.

The upper sample quartile is 0.280.

The lower sample quartile is 0.185.

6.3.10 The sample mean is $\bar{x} = 9.2294$.

The sample median is 9.435.

The sample trimmed mean is 9.3165.

The sample standard deviation is $s = 0.8423$.

The upper sample quartile is 9.81.

The lower sample quartile is 8.9825.

6.3.11 The sample mean is

$\frac{65+x}{6}$

and

$\sum_{i=1}^{6} x_i^2 = 1037 + x^2$.

Therefore,

$s^2 = \frac{1037+x^2-(65+x)^2/6}{5}$

which by differentiation can be shown to be minimized when $x = 13$ (which is the average of the other five data points).

6.3.12 A

6.3.13 B

6.3.14 B

6.3.15 A

6.3.16 B

6.7.1 The population from which the sample is drawn would be all of the birds on the island.

However, the sample may not be representative if some species are more likely to be observed than others.

It appears that the grey markings are the most common, followed by the black markings.

6.7.2 There do not appear to be any seasonal effects, although there may possibly be a correlation from one month to the next.

The sample mean is $\bar{x} = 17.79$.

The sample median is 17.

The sample trimmed mean is 17.36.

The sample standard deviation is $s = 6.16$.

The upper sample quartile is 21.75.

The lower sample quartile is 14.

6.7.3 One question of interest in interpreting this data set is whether or not the month of sampling is representative of other months.

The sample is skewed.

The most frequent data value (the sample mode) is one error.

The sample mean is $\bar{x} = 1.633$.

The sample median is 1.5.

The sample trimmed mean is 1.615.

The sample standard deviation is $s = 0.999$.

The upper sample quartile is 2.

The lower sample quartile is 1.

6.7.4 The population would be all adult males who visit the clinic.

This could be representative of all adult males in the population unless there is something special about the clientele of this clinic.

The largest observation 75.9 looks like an outlier on a histogram but may be a valid observation.

The sample mean is $\bar{x} = 69.618$.

The sample median is 69.5.

The sample trimmed mean is 69.513.

The sample standard deviation is $s = 1.523$.

The upper sample quartile is 70.275.

The lower sample quartile is 68.6.

6.7.5 Two or three of the smallest observations and the largest observation may be considered to be outliers.

The sample mean is $\bar{x} = 32.042$.

The sample median is 32.55.

The sample trimmed mean is 32.592.

The sample standard deviation is $s = 5.817$.

The upper sample quartile is 35.5.

The lower sample quartile is 30.425.

6.7.6 The population of interest can be considered to be the soil throughout the construction site.

If the soil is of a fairly uniform type, and if the samples were taken representatively throughout the site, then they should provide accurate information on the soil throughout the entire construction site.

The sample mean is $\bar{x} = 25.318$.

The sample median is 25.301.

The sample trimmed mean is 25.319.

The sample standard deviation is $s = 0.226$.

The upper sample quartile is 25.501.

The lower sample quartile is 25.141.

6.7.15 (a) True

(b) False

(c) True

(d) False

6.7.16 B

6.7.23 A

6.7.24 C

6.7.25 A

6.7.26 D

6.7.27 B

6.7.28 A

6.7.29 A