STA102 Spring 2002
Chapter 3 Solutions to Suggested Even Problems

Exercise 2

The mean is preferred when the distribution of your (numerical) data values is symmetric and unimodal. The median is preferred when your (numerical) data are skewed. The mode(s) is (are) not used so often but may be preferred when your data show more than one mode. Also, the mode can be used on nominal and ordinal data values whereas the mean and median cannot. The mode may not exist.

Exercise 4

Yes. See section 3.3.1 on the Grouped Mean and section 3.3.2 on the Grouped Variance. Some people may not be comfortable (for whatever reason) having their income available as "raw" data. Grouping in the form of a frequency distribution table or histogram will mask any individual income value, but still retains enough information to calculate a rough estimate of the mean and variance.

Exercise 6

a. mean $\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} = \frac{\sum_{i=1}^{13} x_i}{13} = \frac{336.85}{13} = 25.9 \textbf{months}$

median = 24 months (the middle value when ordered)
modes 12 and 14 months
range=(max. value – min. value) = (96-0.1)=95.9 months
IQR=(Q3 – Q1) =(36-4)=32 months
s.d. $\sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}} = \sqrt{\frac{\sum_{i=1}^{13} (x_i - \bar{x})^2}{13-1}} = \sqrt{749.2} = 27.4 \textbf{months}$

b.

$$\sum_{i=1}^{n} (x_i - \bar{x}) = \sum_{i=1}^{n} x_i - \sum_{i=1}^{n} \bar{x} = \sum_{i=1}^{n} x_i - n\bar{x} = \sum_{i=1}^{n} x_i - n\frac{\sum_{i=1}^{n} x_i}{n} = \sum_{i=1}^{n} x_i - \sum_{i=1}^{n} x_i = 0$$

(This works for any n and any data values.)

Exercise 8
a. median (bulimic) = 21.6 kcal/kg; median (healthy) = 30.6 kcal/kg
b. Q1: n*k/100 = 23*25/100 = 5.75, so round up to 6 and Q1 is the 6^{th} ordered data (bulimic) value: 18.1.
Q2: n*k/100 = 23*75/100 = 17.25, so round up to 18 and Q3 is the 18^{th} ordered data (bulimic) value: 25.2
IQR=(Q3-Q1)=25.2-18.1=7.1 kcal/kg
Similar calculations show that IRQ (healthy) = (36.6-23.8) = 12.8 kcal/kg
c. Daily caloric intake tends to be higher for the healthy adolescents (as indicated by the median). This group also exhibits greater variability (as indicated by the IRQ).