Section 1.3

34.

a. For urban homes, $\bar{x}$ = 21.55 EU/mg; for farm homes, $\bar{x}$ = 8.56 EU/mg. The average endotoxin concentration in urban homes is more than double the average endotoxin concentration in farm homes.

b. For urban homes, $\tilde{x}$ = 17.00 EU/mg; for farm homes, $\tilde{x}$ = 8.90 EU/mg. The median endotoxin concentration in urban homes is nearly double the median endotoxin concentration in farm homes. The mean and median endotoxin concentration for urban homes are so different because the few large values, especially the extreme value of 80.0, raise the mean but not the median.

c. For urban homes, deleting the smallest ($x = 4.0$) and largest ($x = 80.0$) values gives a trimmed mean of $\bar{x}_{tr}$ = 153/9 = 17 EU/mg. The corresponding trimming percentage is 100(1/11) ≈ 9.1%. The trimmed mean is less than the mean of the entire sample, since the sample was positively skewed. Coincidentally, the median and trimmed mean are equal.

For farm homes, deleting the smallest ($x = 0.3$) and largest ($x = 21.0$) values gives a trimmed mean of $\bar{x}_{tr}$ = 107.1/13 = 8.24 EU/mg. The corresponding trimming percentage is 100(1/15) ≈ 6.7%. The trimmed mean is below, though not far from, the mean and median of the entire sample.

38

a. The reported values are (in increasing order) 110, 115, 120, 120, 125, 130, 130, 135, and 140. Thus the median of the reported values is 125.

b. 127.6 is reported as 130, so the median is now 130, a very substantial change. When there is rounding or grouping, the median can be highly sensitive to small change.

Section 1.4

45.

a. $\bar{x}$ = 115.58. The deviations from the mean are 116.4 – 115.58 = .82, 115.9 – 115.58 = .32, 114.6 –115.58 = –.98, 115.2 – 115.58 = –.38, and 115.8 – 115.58 = .22. Notice that the deviations from the mean sum to zero, as they should.

b. $s^2 = [(.82)^2 + (.32)^2 + (-.98)^2 + (-.38)^2 + (.22)^2]/(5 - 1) = 1.928/4 = .482$, so $s = .694$.

c. $\Sigma x_i^2 = 66795.61$, so $s^2 = S_{xx}/(n-1) = \left(\Sigma x_i^2 - (\Sigma x_i)^2/n\right)/(n-1) =$ $(66795.61 - (577.9)^2/5)/4 = 1.928/4 = .482$.

d. The new sample values are: 16.4 15.9 14.6 15.2 15.8. While the new mean is 15.58, all the deviations are the same as in part (a), and the variance of the transformed data is identical to that of part (b).

49.

a. $\Sigma x_i = 2.75 + \cdots + 3.01 = 56.80$, $\Sigma x_i^2 = 2.75^2 + \cdots + 3.01^2 = 197.8040$

b. $s^2 = \dfrac{197.8040 - (56.80)^2/17}{16} = \dfrac{8.0252}{16} = .5016, \quad s = .708$

51.

a. From software, s^2 = 1264.77 min^2 and s = 35.56 min. Working by hand, $\Sigma x = 2563$ and $\Sigma x^2 = 368501$, so

$$s^2 = \frac{368501 - (2563)^2/19}{19-1} = 1264.766 \text{ and } s = \sqrt{1264.766} = 35.564$$

b. If y = time in hours, then $y = cx$ where $c = \frac{1}{60}$. So, $s_y^2 = c^2 s_x^2 = \left(\frac{1}{60}\right)^2 1264.766 = .351\,\text{hr}^2$ and $s_y = cs_x = \left(\frac{1}{60}\right)35.564 = .593\,\text{hr}$.