**HW 1 Even Solutions**

**Even problems:** Ch 1: 34ab, 44bc, 54bc

**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.

**44**

**b.** Note: If we apply the hint and subtract 180 from each observation, the mean will be 1.41, and the middle two columns will not change. The sum and sum of squares will change, but those effects will cancel and the answer below will stay the same.

| | $x_i$ | $(x_i - \bar{x})$ | $(x_i - \bar{x})^2$ | $x_i^2$ |
|---|---|---|---|---|
| | 180.5 | –0.90833 | 0.82507 | 32580.3 |
| | 181.7 | 0.29167 | 0.08507 | 33014.9 |
| | 180.9 | –0.50833 | 0.25840 | 32724.8 |
| | 181.6 | 0.19167 | 0.03674 | 32978.6 |
| | 182.6 | 1.19167 | 1.42007 | 33342.8 |
| | 181.6 | 0.19167 | 0.03674 | 32978.6 |
| | 181.3 | –0.10833 | 0.01174 | 32869.7 |
| | 182.1 | 0.69167 | 0.47840 | 33160.4 |
| | 182.1 | 0.69167 | 0.47840 | 33160.4 |
| | 180.3 | –1.10833 | 1.22840 | 32508.1 |
| | 181.7 | 0.29167 | 0.08507 | 33014.9 |
| | 180.5 | –0.90833 | 0.82507 | 32580.3 |
| sums: | 2176.9 | 0 | 5.769167 | 394913.6 |
| | $\bar{x}$ = 181.41 | | | |

$s^2 = \sum_{i=1}^{n}(x_i - \bar{x})^2 / (n-1) = 5.769167/(12-1) = 0.52447.$

**c.** $s = \sqrt{0.52447} = 0.724.$

**54**

**b.** Each half has 21 observations. The lower fourth is the $11^{th}$ observation, 87 N. The upper fourth is the $32^{nd}$ observation ($11^{th}$ from the top), 210 N. The fourth spread is the difference: $f_s = 210 - 87 = 123$ N.

**c.** min = 16; lower fourth = 87; median = 140; upper fourth = 210; max = 403

The boxplot tells a similar story: grip strengths are slightly positively skewed, with a median of 140N and a fourth spread of 123 N.