Lesson 1.2.3

1-46. a. $\mu = 3$ rocks per citizen

b. variance = 4 rocks^2 per citizen

1-47. a. [1, 1] [1, 5] [5, 1] [5, 5]

b. [1, 1] $\to$ 0 rocks^2, [1, 5] $\to$ 4 rocks^2, [5, 1] $\to$ 4 rocks^2, [5, 5] $\to$ 0 rocks^2

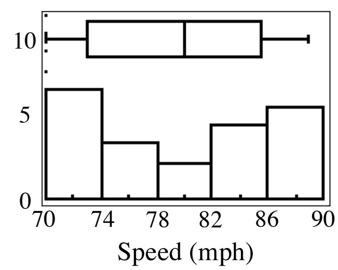
1-48. $\frac{(\text{many})(0+4+4+0)}{4(\text{many})} = 2$ rocks^2

a. Calculating variance for samples would systematically underestimate the population variance.

b. [1, 1] $\to$ 0 rocks^2, [1, 5] $\to$ 8 rocks^2, [5, 1] $\to$ 8 rocks^2, [5, 5] $\to$ 0 rocks^2

c. $\frac{(\text{many})(0+8+8+0)}{4(\text{many})} = 4$ rocks^2, it is the same.

1-49. See graph at right. The shape is double-peaked and symmetric. There are no outliers. The mean speed is 79.5 mph with a sample standard deviation of 6.98 mph.



1-50. a. The rabbit speeds are skewed to the left, centered about a median of 28 mph, with an interquartile range of 2 mph. According to the 1.5 IQR rule, all values less than 24 mph can be considered outliers.

b. You can see the individual data points and the number of rabbit speeds in the sample. There is a gap in the data with no 25 mph observations.

c. The median, quartiles, IQR, and distribution shape are easily seen in the boxplot.

1-51. a. $\frac{23.5+24.5+25.5(3)+26.5(7)+27.5(9)+28.5(17)+29.5(11)+30.5(4)}{53} = 28.08$ mph

b. The median would be the 27$^{\text{th}}$ observation if all 53 rabbit speeds were put into an ordered list. This would be in the bar with a midpoint of 28.5. So the estimate for the median is 28.5 mph.

c. variance = 2.363 mph^2, stdev = 1.537 mph

d. Typical rabbits in this sample differ from the mean of 28.08 mph by about 1.5 mph.

1-52. a. 136:36

b. 36:246

c. A two-way table or Venn diagram is best because it shows overlap; the data is categorical and there is no order to it.

