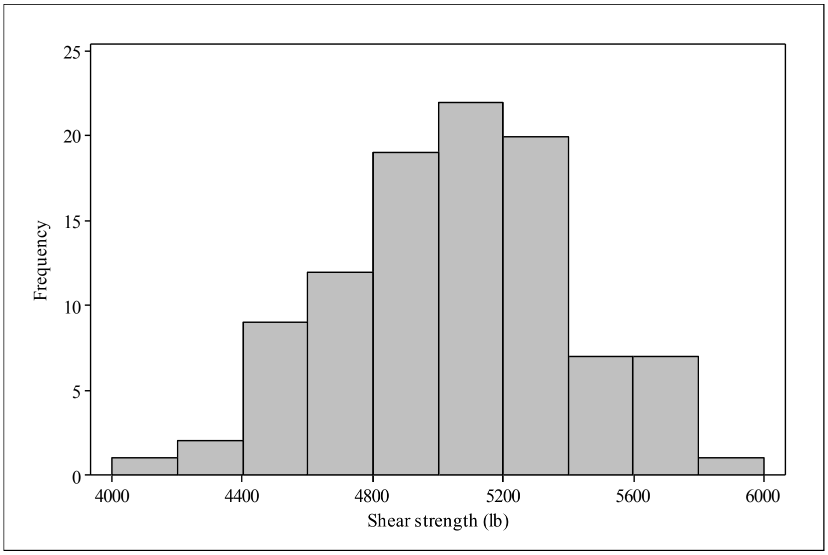
Chapter 1

24. The distribution of shear strengths is roughly symmetric and bell-shaped, centered at about 5000 lbs and ranging from about 4000 to 6000 lbs.



36.

a. A stem-and leaf display of this data appears below:

32	55	stem: ones
33	49	leaf: tenths
34		
35	6699	
36	34469	
37	03345	
38	9	
39	2347	
40	23	
41		
42	4	

The display is reasonably symmetric, so the mean and median will be close.

b. The sample mean is $\bar{x}$ = 9638/26 = 370.7 sec, while the sample median is $\tilde{x}$ = (369+370)/2 = 369.50 sec.

c. The largest value (currently 424) could be increased by any amount. Doing so will not change the fact that the middle two observations are 369 and 370, and hence, the median will not change. However, the value x = 424 cannot be changed to a number less than 370 (a change of 424 – 370 = 54) since that will change the middle two values.

d. Expressed in minutes, the mean is (370.7 sec)/(60 sec) = 6.18 min, while the median is 6.16 min.

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.

44.

a. range = 49.3 – 23.5 = 25.8

b.

x_i	$(x_i - \bar{x})$	$(x_i - \bar{x})^2$	x_i^2
29.5	–1.53	2.3409	870.25
49.3	18.27	333.7929	2430.49
30.6	–0.43	0.1849	936.36
28.2	–2.83	8.0089	795.24
28.0	–3.03	9.1809	784.00
26.3	–4.73	22.3729	691.69
33.9	2.87	8.2369	1149.21
29.4	–1.63	2.6569	864.36
23.5	–7.53	56.7009	552.25
31.6	0.57	0.3249	998.56
$\Sigma x_i = 310.3$	$\Sigma(x_i - \bar{x}) = 0$	$\Sigma(x_i - \bar{x})^2 = 443.801$	$\Sigma x_i^2 = 10072.41$

$$\bar{x} = 31.03\ ;\ s^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1} = \frac{443.801}{9} = 49.3112$$

c. $s = \sqrt{49.3112} = 7.0222$

d. $s^2 = \dfrac{\Sigma x^2 - (\Sigma x)^2/n}{n-1} = \dfrac{10072.41 - (310.3)^2/10}{9} = 49.3112$

Chapter 2

3.

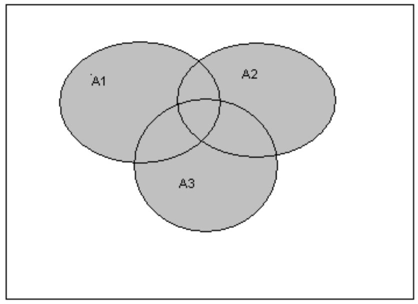
a. $A = \{SSF, SFS, FSS\}$.

b. $B = \{SSS, SSF, SFS, FSS\}$.

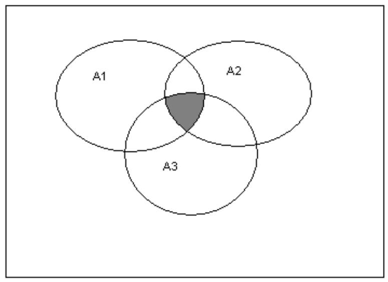
c. For event C to occur, the system must have component 1 working (S in the first position), then at least one of the other two components must work (at least one S in the second and third positions): $C = \{SSS, SSF, SFS\}$.

d. $C' = \{SFF, FSS, FSF, FFS, FFF\}$.
$A \cup C = \{SSS, SSF, SFS, FSS\}$.
$A \cap C = \{SSF, SFS\}$.
$B \cup C = \{SSS, SSF, SFS, FSS\}$. Notice that B contains C, so $B \cup C = B$.
$B \cap C = \{SSS\ SSF, SFS\}$. Since B contains C, $B \cap C = C$.

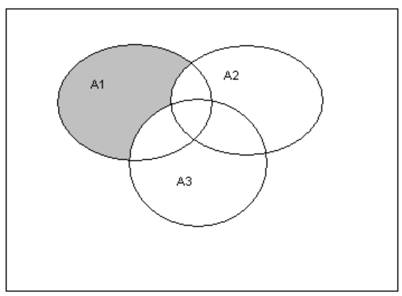
8.



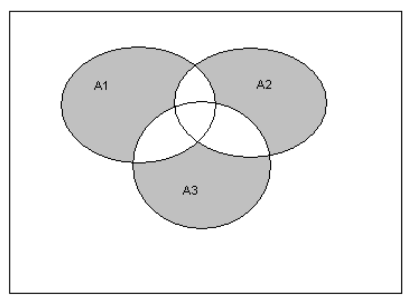
a. $A_1 \cup A_2 \cup A_3$



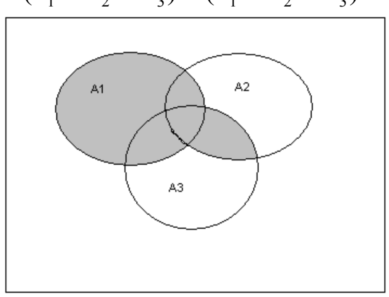
b. $A_1 \cap A_2 \cap A_3$



c. $A_1 \cap A_2' \cap A_3'$



d. $(A_1 \cap A_2' \cap A_3') \cup (A_1' \cap A_2 \cap A_3') \cup (A_1' \cap A_2' \cap A_3)$



e. $A_1 \cup (A_2 \cap A_3)$

11.

a. .07.

b. .15 + .10 + .05 = .30.

c. Let A = the selected individual owns shares in a stock fund. Then $P(A)$ = .18 + .25 = .43. The desired probability, that a selected customer does not shares in a stock fund, equals $P(A')$ = 1 – $P(A)$ = 1 – .43 = .57. This could also be calculated by adding the probabilities for all the funds that are not stocks.

26. These questions can be solved algebraically, or with the Venn diagram below.

a. $P(A_1') = 1 - P(A_1)$ = 1 – .12 = .88.

b. The addition rule says $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. Solving for the intersection ("and") probability, you get $P(A_1 \cap A_2) = P(A_1) + P(A_2) - P(A_1 \cup A_2)$ = .12 + .07 – .13 = .06.

c. A Venn diagram shows that $P(A \cap B') = P(A) - P(A \cap B)$. Applying that here with $A = A_1 \cap A_2$ and $B = A_3$, you get $P([A_1 \cap A_2] \cap A_3') = P(A_1 \cap A_2) - P(A_1 \cap A_2 \cap A_3) =$ .06 – .01 = .05.

d. The event "at most two defects" is the complement of "all three defects," so the answer is just 1 – $P(A_1 \cap A_2 \cap A_3)$ = 1 – .01 = .99.