CHAPTER 1

33.

a. $\bar{x} = 192.57$, $\tilde{x} = 189$ .The mean is larger than the median, but they are still fairly close together.

b. Changing the one value, $\bar{x} = 189.71$, $\tilde{x} = 189$. The mean is lowered, the median stays the same.

d. For n = 13, Σx = (119.7692) x 13 = 1,557
For n = 14, Σx = 1,557 + 159 = 1,716

$$\bar{x} = \frac{1716}{14} = 122.5714 \text{ or } 122.6$$

35.

b. The smallest value (8.0) could be increased to any number below 12.0 (a change of less than 4.0) without affecting the value of the sample median.

51.

a. $\Sigma x = 2563$ and $\Sigma x^2 = 368{,}501$, so

$$s^2 = \frac{[368{,}501 - (2563)^2/19]}{18} = 1264.766 \text{ and } s = 35.564$$

b. If y = time in minutes, then y = cx where $c = \frac{1}{60}$, so

$$s_y^2 = c^2 s_x^2 = \frac{1264.766}{3600} = .351 \text{ and } s_y = cs_x = \frac{35.564}{60} = .593$$

CHAPTER 2

2.

a. Event A = { RRR, LLL, SSS }

b. Event B = { RLS, RSL, LRS, LSR, SRL, SLR }

c. Event C = { RRL, RRS, RLR, RSR, LRR, SRR }

d. Event D = { RRL, RRS, RLR, RSR, LRR, SRR, LLR, LLS, LRL, LSL, RLL, SLL, SSR, SSL, SRS, SLS, RSS, LSS }

e. Event D′ contains outcomes where all cars go the same direction, or they all go different directions:
D′ = { RRR, LLL, SSS, RLS, RSL, LRS, LSR, SRL, SLR }

Because Event D totally encloses Event C, the compound event $C \cup D = D$:
$C \cup D$ = { RRL, RRS, RLR, RSR, LRR, SRR, LLR, LLS, LRL, LSL, RLL, SLL, SSR, SSL, SRS, SLS, RSS, LSS }

Using similar reasoning, we see that the compound event $C \cap D = C$:
$C \cap D$ = { RRL, RRS, RLR, RSR, LRR, SRR }

3.

a. Event A = { SSF, SFS, FSS }

b. Event B = { SSS, SSF, SFS, FSS }

c. For Event C, 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 2nd and 3rd positions: Event C = { SSS, SSF, SFS }

d. Event C′ = { SFF, FSS, FSF, FFS, FFF }
Event $A \cup C$ = { SSS, SSF, SFS, FSS }
Event $A \cap C$ = { SSF, SFS }
Event $B \cup C$ = { SSS, SSF, SFS, FSS }
Event $B \cap C$ = { SSS SSF, SFS }

13.

a. awarded either #1 or #2 (or both):
$P(A_1 \cup A_2) = P(A_1) + P(A_2) - P(A_1 \cap A_2) = .22 + .25 - .11 = .36$

b. awarded neither #1 or #2:
$P(A_1' \cap A_2') = P[(A_1 \cup A_2)'] = 1 - P(A_1 \cup A_2) = 1 - .36 = .64$

c. awarded at least one of #1, #2, #3:

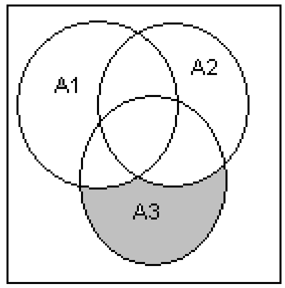
$$P(A_1 \cup A_2 \cup A_3) = P(A_1) + P(A_2) + P(A_3) - P(A_1 \cap A_2) - P(A_1 \cap A_3) - P(A_2 \cap A_3) + P(A_1 \cap A_2 \cap A_3)$$
$$= .22 + .25 + .28 - .11 - .05 - .07 + .01 = .53$$

d. awarded none of the three projects:

$P(A_1' \cap A_2' \cap A_3') = 1 - P(\text{awarded at least one}) = 1 - .53 = .47$.

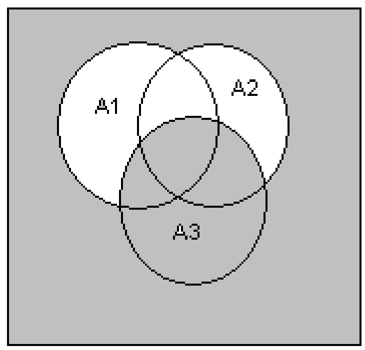
e. awarded #3 but neither #1 nor #2:

$$P(A_1' \cap A_2' \cap A_3) = P(A_3) - P(A_1 \cap A_3) - P(A_2 \cap A_3) + P(A_1 \cap A_2 \cap A_3) = .28 - .05 - .07 + .01 = .17$$

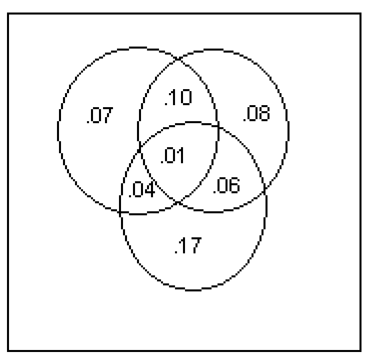


f. either (neither #1 nor #2) or #3:

$$P[(A_1' \cap A_2') \cup A_3] = P(\text{shaded region}) = P(\text{awarded none}) + P(A_3) = .47 + .28 = .75$$



Alternatively, answers to **a – f** can be obtained from probabilities on the accompanying Venn diagram



17.

a. The probabilities do not add to 1 because there are other software packages besides SPSS and SAS for which requests could be made.

b. $P(A') = 1 - P(A) = 1 - .30 = .70$

c. $P(A \cup B) = P(A) + P(B) = .30 + .50 = .80$
(since A and B are mutually exclusive events)

d. $P(A' \cap B') = P[(A \cup B)']$ (De Morgan's law)
$= 1 - P(A \cup B)$
$= 1 - .80 = .20$

22.

a. $P(A_1 \cap A_2) = P(A_1) + P(A_2) - P(A_1 \cup A_2) = .4 + .5 - .6 = .3$

b. $P(A_1 \cap A_2') = P(A_1) - P(A_1 \cap A_2) = .4 - .3 = .1$

c. $P(\text{exactly one}) = P(A_1 \cup A_2) - P(A_1 \cap A_2) = .6 - .3 = .3$

26.

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

b. $P(A_1 \cap A_2) = P(A_1) + P(A_2) - P(A_1 \cup A_2) = .12 + .07 - .13 = .06$

c. $P(A_1 \cap A_2 \cap A_3') = P(A_1 \cap A_2) - P(A_1 \cap A_2 \cap A_3) = .06 - .01 = .05$

d. $P(\text{at most two errors}) = 1 - P(\text{all three types})$
$= 1 - P(A_1 \cap A_2 \cap A_3)$
$= 1 - .01 = .99$