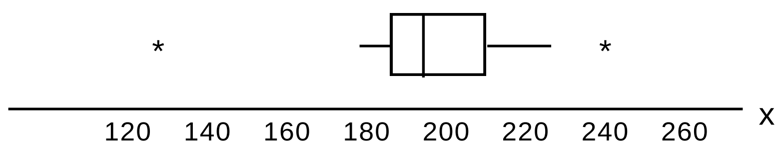
1.57

a. f_s = 216.8 – 196.0 = 20.8
inner fences: 196 – 1.5(20.8) = 164.6, 216.8 + 1.5(20.8) = 248
outer fences: 196 – 3(20.8) = 133.6, 216.8 + 3(20.8) = 279.2
Of the observations listed, 125.8 is an extreme low outlier and 250.2 is a mild high outlier.

b. A boxplot of this data appears below. There is a bit of positive skew to the data but, except for the two outliers identified in part (a), the variation in the data is relatively small.



1.78

a. Since the constant $\overline{x}$ is subtracted from each x value to obtain each y value, and addition or subtraction of a constant doesn't affect variability, $s_y^2 = s_x^2$ and $s_y = s_x$.

b. Let $c = 1/s$, where s is the sample standard deviation of the x's (and also, by part (a), of the y's). Then $z_i = cy_i \Rightarrow s_z^2 = c^2 s_y^2 = (1/s)^2 s^2 = 1$ and $s_z = 1$. That is, the "standardized" quantities $z_1, \ldots, z_n$ have a sample variance and standard deviation of 1.

2.42

a. If Player X sits out, the number of possible teams is $\binom{3}{1}\binom{4}{2}\binom{4}{2}$ = 108. If Player X plays guard, we need one <u>more</u> guard, and the number of possible teams is $\binom{3}{1}\binom{4}{1}\binom{4}{2}$ = 72. Finally, if Player X plays forward, we need one <u>more</u> forward, and the number of possible teams is $\binom{3}{1}\binom{4}{2}\binom{4}{1}$ = 72. So, the total possible number of teams from this group of 12 players is 108 + 72 + 72 = 252.

b. Using the idea in **a**, consider all possible scenarios. If Players X and Y both sit out, the number of possible teams is $\binom{3}{1}\binom{5}{2}\binom{5}{2}$ = 300. If Player X plays while Player Y sits out, the number of possible teams is $\binom{3}{1}\binom{5}{1}\binom{5}{2} + \binom{3}{1}\binom{5}{2}\binom{5}{1}$ = 150 + 150 = 300. Similarly, there are 300 teams with Player X benched and Player Y in. Finally, there are three cases when X and Y both play: they're both guards, they're both forwards, or they split duties. The number of ways to select the rest of the team under these scenarios is $\binom{3}{1}\binom{5}{0}\binom{5}{2} + \binom{3}{1}\binom{5}{2}\binom{5}{0} + \binom{3}{1}\binom{5}{1}\binom{5}{1}$ = 30 + 30 + 75 = 135.

Since there are $\binom{15}{5}$ = 3003 ways to randomly select 5 players from a 15-person roster, the probability of randomly selecting a legitimate team is $\frac{300+300+135}{3003} = \frac{735}{3003}$ = .245.

2.93

$P(A \cup B) = P(A) + P(B) - P(A)P(B)$
$.626 = P(A) + P(B) - .144$

So P(A) + P(B) = .770 and P(A)P(B) = .144.

Let x = P(A) and y = P(B), then using the first equation, y = .77 – x, and substituting this into the second equation, we get x (.77 – x) = .144 or

$x^2 - .77x + .144 = 0$. Use the quadratic formula to solve: $\frac{.77 \pm \sqrt{.77^2 - (4)(.144)}}{2} = \frac{.77 \pm .13}{2} = .32$

or .45

So P(A) = .45 and P(B) = .32

2.100

a. P(both +) = P(carrier $\cap$ both +) + P(not a carrier $\cap$ both +)
=P(both + | carrier) x P(carrier)
+ P(both + | not a carrier) x P(not a carrier)
$= (.90)^2(.01) + (.05)^2(.99) = .01058$

$P(\text{both} -) = (.10)^2(.01) + (.95)^2(.99) = .89358$

P(tests agree) = .01058 + .89358 = .90416

b. P(carrier | both + ve) = $\frac{P(carrier \cap both.positive)}{P(both.positive)} = \frac{(.90)^2(.01)}{.01058} = .7656$

2.101

Let A = 1st functions, B = 2nd functions, so P(B) = .9, $P(A \cup B) = .96$, $P(A \cap B)=.75$. Thus, $P(A \cup B) = P(A) + P(B) - P(A \cap B) = P(A) + .9 - .75 = .96$, implying P(A) = .81.

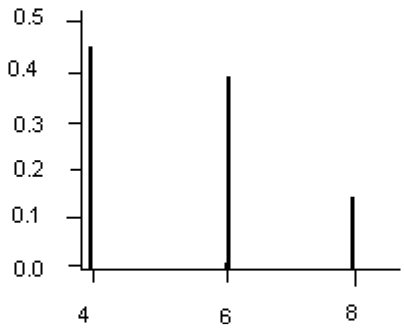
This gives P(B | A) = $\frac{P(B \cap A)}{P(A)} = \frac{.75}{.81} = .926$

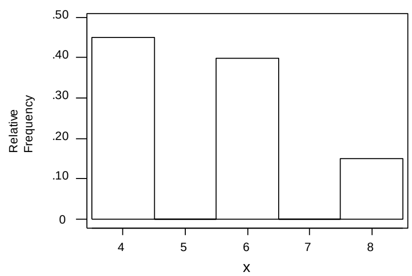
3.11

a.

x	4	6	8
P(x)	.45	.40	.15

b.





c. $P(x \geq 6) = .40 + .15 = .55$ $P(x > 6) = .15$