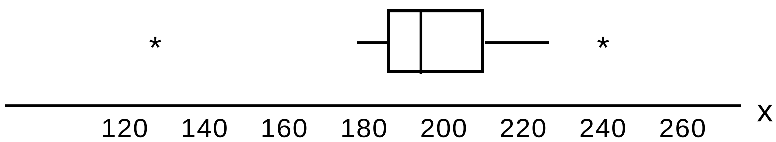
1.57

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 $\bar{x}$ 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

Seats:

1	2	3	4	5	6

P(J&P in 1&2) $= \dfrac{2\times1\times4\times3\times2\times1}{6\times5\times4\times3\times2\times1} = \dfrac{1}{15} = .0667$

P(J&P next to each other) = P(J&P in 1&2) + … + P(J&P in 5&6)

$$= 5\times\frac{1}{15} = \frac{1}{3} = .333$$

P(at least one H next to his W) = 1 – P(no H next to his W)
We count the # of ways of no H next to his W as follows:
# of orderings with a H-W pair in seats #1 and 3 and no H next to his W = 6* × 4 × 1* × $2^{\#}$ × 1 × 1 = 48
*= pair, $^{\#}$=can't put the mate of seat #2 here or else a H-W pair would be in #5 and 6.

# of orderings without a H-W pair in seats #1 and 3, and no H next to his W = 6 × 4 × $2^{\#}$ × 2 × 2 × 1 = 192
$^{\#}$= can't be mate of person in seat #1 or #2.
So, # of seating arrangements with no H next to W = 48 + 192 = 240

And P(no H next to his W) = $= \dfrac{240}{6\times5\times4\times3\times2\times1} = \dfrac{1}{3}$, so

P(at least one H next to his W) = 1 – $\dfrac{1}{3} = \dfrac{2}{3}$

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: $\dfrac{.77 \pm \sqrt{.77^2 - (4)(.144)}}{2} = \dfrac{.77 \pm .13}{2} = .32$

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(both –) $= (.10)^2(.01) + (.95)^2(.99) = .89358$

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

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

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 $P(A) = .81$.

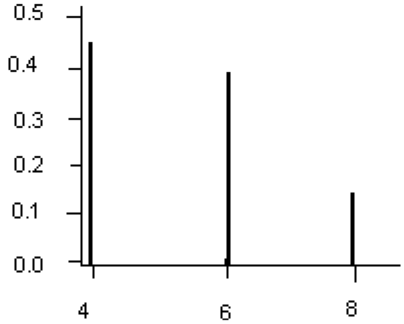
This gives P(B | A) = $\dfrac{P(B \cap A)}{P(A)} = \dfrac{.75}{.81} = .926$

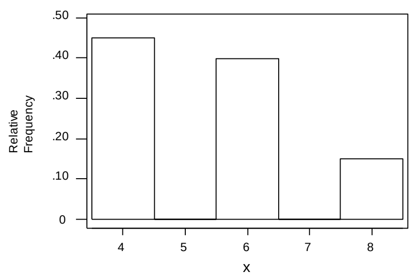
3.11

a.

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

b.





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