2.46 a) The center of the distribution of the 2014 scores appears to be shifted downward compared to the 2011 score distribution (around 1560 compared to around 1600 in 2011?). Both distributions seem to be slightly skewed.

b) See histogram below.
c) The differences are almost all below zero, which reinforces the fact that the 2014 scores tend to be lower than the 2011 scores.

d) The largest positive difference (65) is Wyoming.

2.66) a)

<table>
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<td>Mean</td>
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<tr>
<td>Median</td>
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b) The sample average of the driving index values is 1.93; the “middle value” of the ordered data set is around 1.755; and the most commonly occurring data value is 1.4.

c) Since the sample mean is greater than the sample median, we can conclude the distribution of driving index values is skewed to the right. This is confirmed by the histogram:
2.149) a)

b) It appears the 2014 scores have slightly greater variability (longer box and longer overall boxplot).

c) The boxplots show no scores to be outliers in either data set.
3.24) a) $\frac{6}{1000} = 0.006$  
   b) $\frac{12}{100} = 0.12$
   c) $\frac{7}{1000} = 0.007$  
   d) $\frac{7}{100} = 0.07$

3.36) a) Sample space for child's gene pair: 
   \{BB, Bb, bB, bb\} where the first letter is the father's contribution and the second letter is the mother's contribution. All these outcomes are equally likely. $P[\text{child has blue eyes}] = P[bb] = \frac{1}{4}$, or 0.25.
   b) In this case, the only possible outcomes are Bb and bb, which are equally likely. 
   $P[\text{child has blue eyes}] = P[bb] = \frac{1}{2} = 0.5$.
   c) The possible outcomes do not include bb, so in this case $P[\text{child has blue eyes}] = 0$.

3.46) a) $P(B^c) = 1 - P(B) = 1 - 0.7 = \frac{3}{10} = 0.3$
   b) $P(A^c) = 1 - P(A) = 1 - 0.4 = 0.6$
   c) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
   \[= 0.4 + 0.7 - 0.3 = 0.8\]

3.48) a) $P(A^c) = P(E_3) + P(E_6) + P(E_8)$
   \[= 0.2 + 0.3 + 0.03 = 0.53\]
   b) $P(B^c) = P(E_1) + P(E_7) + P(E_8)$
   \[= 0.10 + 0.06 + 0.03 = 0.19\]
c) \(P(A^c \land B) = P(E_3) + P(E_6) = 0.2 + 0.3 = 0.5\)

d) \(P(A \cup B) = 1 - P(E_8) = 1 - 0.03 = 0.97\)

e) \(P(A \land B) = P(E_2) + P(E_4) + P(E_5) = 0.05 + 0.2 + 0.06 = 0.31\)

f) \(P(A^c \cup B^c) = P(E_1) + P(E_7) + P(E_3) + P(E_6) + P(E_8) = 0.10 + 0.06 + 0.2 + 0.3 + 0.03 = 0.69\)

g) No, since \(P(A \land B) \neq 0\).

3.58) a) \(P(A) = \frac{39}{59} = 0.661\)

b) \(P(B) = \frac{11}{59} = 0.186\)

c) \(P(A \land B) = P(\text{selected victim is male who jumped}) = \frac{7}{59}. \text{ Since } P(A \land B) \neq 0, \text{ A and B are not mutually exclusive.}\)

d) \(P(A^c) = 1 - P(A) = 1 - 0.661 = 0.339\)

e) \(P(A \cup B) = P(A) + P(B) - P(A \land B) = \frac{39}{59} + \frac{11}{59} - \frac{7}{59} = \frac{43}{59} = 0.729\)

f) \(P(A \land B) = \frac{7}{59} = 0.119\)

3.76) a) \(P(A) = P(E_1) + P(E_3) = 0.22 + 0.15 = 0.37\)

b) \(P(B) = P(E_2) + P(E_3) + P(E_4) = 0.31 + 0.15 + 0.22 = 0.68\)

c) \(P(A \land B) = P(E_3) = 0.15\)
d) \( P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{0.15}{0.68} = 0.221 \)

e) \( P(B \cap C) = 0 \) since they have no outcomes in common.

f) \( P(C|B) = \frac{P(B \cap C)}{P(B)} = \frac{0}{0.68} = 0 \)

g) \( P(A|B) = 0.221 \neq P(A) = 0.37 \), so A and B are NOT independent.

\( P(C) = P(E_1) + P(E_5) = 0.22 + 0.10 = 0.32 \)

\( P(A \cap C) = P(E_1) = 0.22 \)

\( P(A \cap C) = 0.22 \neq P(A)P(C) = (0.37)(0.32) = 0.118 \),
so A and C are NOT independent.

\( P(C|B) = 0 \neq P(C) = 0.32 \), so B and C are NOT independent.

3.86

a) \( P(\text{Stated} | \text{Guilty}) = \frac{P(\text{Stated} \cap \text{Guilty})}{P(\text{Guilty})} \)

\[ = \frac{45/171}{57/171} = \frac{45}{57} = 0.789 \]

b) \( P(\text{Anger} | \text{Not Choose}) = \frac{P(\text{Anger} \cap \text{Not Choose})}{P(\text{Not Choose})} \)

\[ = \frac{50/171}{111/171} = \frac{50}{111} = 0.450 \]

c) \( P(\text{Repair}) = P(\text{Stated}) = \frac{60}{171} = 0.351 \)

\( \neq P(\text{Stated} | \text{Guilty}) = 0.789 \). NOT independent.
3.96) a) 0.05 + 0.02 = \boxed{0.07}

b) \( P(\text{Obesity} \cup \text{Sarcopenia}) = P(\text{Obesity}) + P(\text{Sarcopenia}) - P(\text{Obesity} \cap \text{Sarcopenia}) = 0.35 + 0.15 - 0.07 = \boxed{0.43} \)

3.136) a) 
\[
P(B_1|A) = \frac{P(A|B_1)P(B_1)}{P(A|B_1)P(B_1) + P(A|B_2)P(B_2) + P(A|B_3)P(B_3)}
\]
\[
= \frac{(0.4)(0.2)}{(0.4)(0.2) + (0.25)(0.15) + (0.6)(0.65)}
\]
\[
= \frac{0.08}{0.5075} = \boxed{0.158}
\]

b) 
\[
P(B_2|A) = \frac{(0.25)(0.15)}{(0.4)(0.2) + (0.25)(0.15) + (0.6)(0.65)}
\]
\[
= \frac{0.0375}{0.5075} = \boxed{0.074}
\]

c) 
\[
P(B_3|A) = \frac{(0.6)(0.65)}{(0.4)(0.2) + (0.25)(0.15) + (0.6)(0.65)}
\]
\[
= \frac{0.39}{0.5075} = \boxed{0.768}
\]

3.144) Let \( A = \) hit, \( B = \) actual defect

\[
P(B|A) = \frac{P(A|B)P(B)}{P(A|B)P(B) + P(A|B^c)P(B^c)}
\]
\[
= \frac{(0.97)(0.01)}{(0.97)(0.01) + (0.005)(0.99)}
\]
\[
= 0.6621
\]

From problem:
\[
P(A|B) = 0.97
\]
\[
P(A|B^c) = 0.005
\]
\[
P(B) = \frac{1}{100} = 0.01
\]