Homework #2

Chapter 13 (p234)

1. (a) False. Probability 1000% is impossible because probabilities must be between 0% and 100%.

(b) True. On average, out of every 10 trials the event in question will happen 9 times and its opposite will happen once.

2. Option (ii) is better. With option (ii) you win a dollar every time you would have won one in option (i), plus in other situations too. (For example, if you draw ♠.)

9. (a) The chance of getting one ♣ is 1/6 for each roll. The rolls are independent so we use the multiplication rule to get

\[
\frac{1}{6} \times \frac{1}{6} \times \cdots \times \frac{1}{6} = \left(\frac{1}{6}\right)^{10} \approx 1.65 \times 10^{-6}
\]

(b) This is the opposite of part (a), so the answer is

\[
1 - \left(\frac{1}{6}\right)^{10} \approx 0.99999998346 = 99.999998346\%
\]

(c) Not the same as part (b). The chance of rolling 5 or less for each die is 5/6, so use multi rule:

\[
\frac{5}{6} \times \frac{5}{6} \times \cdots \times \frac{5}{6} = \left(\frac{5}{6}\right)^{10} \approx 16.15\%
\]
Chapter 14 (p. 252)

1 (a) Only one way to get this out of 36.
   \[ \frac{1}{36} \]

(b) Six ways to get this out of 36.
   \[ \frac{6}{36} = \frac{1}{6} \]

3 (a) False. These events are not mutually exclusive, so you cannot use the addition rule.
   (actual chance would be \( 1 - \left(\frac{5}{6}\right)^3 \))

(b) False. Clearly you might get tails each time.

7 In a single draw the chance of getting \( \square \) is \( \frac{2}{5} \).
We will compute the chance of the opposite. To not get \( \square \) 4 times, the chance would be
\[ \frac{3}{5} \cdot \frac{3}{5} \cdot \frac{3}{5} \cdot \frac{3}{5} = \frac{81}{625} \]
Thus the chance of getting \( \square \) at least once is
\[ 1 - \frac{81}{625} = \frac{544}{625} = 87.04\% \]
2. \((\frac{5}{6})^{10}\)

The chance of not landing on a : in a single roll is \(\frac{5}{6}\). Use the multiplication rule.

6. False. The lists are the same length. Pick 6 out of 8 for a committee is the same as picking 2 out of 8 to not be in the committee.

Also, you can compute

\[
\frac{8!}{6!\:(8-6)!} = \frac{8!}{6!\:2!} = \frac{8!}{2!\:(8-2)!} = \frac{8!}{2\!\!(6)!}
\]