Pg. 362-366 #1, 5, 6, 11, 17, 18, 19, 22, 25, 45

1. \( S = \{ HH, HT, TT, TH \} \)
   a) Yes, the outcomes are equally likely because the probability of tossing \( H \) or \( T \) should be the same.
   b) \( S = \{ 0, 1, 2, 3 \} \)
      No, it is more likely to get 1 or 2 boys than 0 or 3 boys.
   c) \( S = \{ HH, TH, TTH, TTT \} \)
      No, there is a better chance of getting just a \( H \) than any other outcome.
      TH has better chance than TTH or TTT.
   d) \( S = \{ 1, 2, 3, 4, 5, 6 \} \)
      No, 6 has the best chance and 1 has the worst chance of being the "largest" number.

5. The events are joint (they overlap), so make a Venn diagram.
   a) \( P(\text{TV} \cap \text{Fridge}) = 0.31 \)
   b) \( P((\text{TV} \cup \text{Fridge}) \cap \text{Both}') = 0.48 \)
   c) \( P(\text{TV} \cap \text{Fridge}') = 0.31 \)

(Remember - fill in middle overlap first and then everything else.)
0 Joint events → Venn diagram will help!
   a) \( P(M' \cap C') = 0.06 \)
   b) \( P(M \cap C') = 0.50 \)
   c) \( P(M \cup C) = 0.94 \)

11

\[
\begin{array}{c|cc|c}
& \text{High} & \text{OK} & \text{Total} \\
\hline
\text{High} & 0.11 & 0.21 & 0.32 \\
\text{Cholesterol OK} & 0.16 & 0.52 & 0.68 \\
\hline
\text{Total} & 0.27 & 0.73 & 1.00
\end{array}
\]

a) \( P(B \cap C) = 0.11 \)

b) \( P(B) = 0.27 \)

c) \( P(C | B) = \frac{P(C \cap B)}{P(B)} = \frac{0.11}{0.27} = 0.4074 \)

"Prob. he has high cholesterol given that he already has high blood pressure."

d) \( P(B | C) = \frac{P(B \cap C)}{P(C)} = \frac{0.11}{0.32} = 0.3438 \)

17

a) \( P(H' \cap H' \cap H') = \frac{39}{52} \cdot \frac{38}{51} \cdot \frac{13}{50} = 0.1453 \)

b) \( P(R \cap R \cap R) = \frac{26}{52} \cdot \frac{25}{51} \cdot \frac{24}{50} = \frac{2}{17} = 0.1176 \)

c) \( P(S' \cap S' \cap S') = \frac{39}{52} \cdot \frac{38}{51} \cdot \frac{37}{50} = 0.0135 \)

d) \( P(\text{at least 1 Ace}) = 1 - P(\text{no Aces}) = 1 - \left( \frac{48}{52} \cdot \frac{47}{51} \cdot \frac{46}{50} \right) = 1 - 0.7826 = 0.2174 \)
18) \( P(A' \cap A' \cap A') = \frac{48}{52} \cdot \frac{47}{51} \cdot \frac{46}{50} = .7826 \)

b) \( P(H \cap H \cap H) = \frac{13}{52} \cdot \frac{12}{51} \cdot \frac{11}{50} = .0129 \)

c) \( P(R' \cap R' \cap R) = \frac{26}{52} \cdot \frac{25}{51} \cdot \frac{24}{50} = .1275 \)

d) \( P(\text{at least 1 diamond}) = 1 - P(\text{no diamonds}) = 1 - P(\text{no diamonds no diamonds}) = 1 - \left( \frac{39}{52} \cdot \frac{38}{51} \cdot \frac{37}{50} \right) = 1 - .4135 = .5865 \)

19) 12 batteries, 5 are dead ... (7 are good)

a) \( P(GNGG) = \frac{7}{12} \cdot \frac{6}{11} = \frac{7}{22} = .3182 \)

b) \( P(\text{at least 1 of 3 works}) = 1 - P(\text{none work}) = 1 - P(DNDND) = 1 - \left( \frac{5}{12} \cdot \frac{4}{11} \cdot \frac{3}{10} \right) = 1 - .0455 = .9545 \)

c) \( P(GNGGNGG) = \frac{7}{12} \cdot \frac{6}{11} \cdot \frac{5}{10} \cdot \frac{4}{9} = \frac{7}{99} = .0707 \)

d) \( P(DNDNDNDNG) = \frac{5}{12} \cdot \frac{4}{11} \cdot \frac{3}{10} \cdot \frac{2}{9} \cdot \frac{7}{8} = .0088 \)

22) a) \( P(R' \cap H') = \frac{25}{12110} \)  

b) \( P(H | R) = \frac{P(H \cap R)}{P(R)} = \frac{.49}{.56} = .875 \)

c) If they are independent, then one would not affect the other.

\( P(H | R) \neq P(H) \)  

This shows they are not the same, so having a retirement plan increases chances of having health ins.
d) No, having both benefits is clearly not mutually exclusive since 49% of American workers have both.

25 \[ P(A | \varnothing) = P(A) \quad P(\varnothing | A) = P(\varnothing) \]

\[ \frac{1}{13} = \frac{4}{52} \quad \frac{1}{4} = \frac{13}{52} \]

\[ \frac{1}{13} = \frac{1}{13} \checkmark \quad \frac{1}{4} = \frac{1}{4} \checkmark \]

Yes, getting an ace is independent of the suit because there are an equal number of Aces in each suit.

45 \[ P(\text{Chuck} | \text{Dish breaks}) = \frac{P(\text{Chuck} \cap \text{Broken dish})}{P(\text{All broken dishes})} = \frac{(0.30)(0.03)}{0.01(0.40) + 0.01(0.30) + 0.03(0.30)} \]

\[ = \frac{0.009}{0.016} = 0.5625 \]