Week in Review—Additional Chapter 1 Material

1. (a) \[ \frac{10}{120} \]
(b) \[ \frac{40}{210} \]
(c) \[ \frac{100+30+70+60}{260+330} = \frac{260}{590} \]

2. (a) \[ \frac{P(F \cap E)}{P(E)} = \frac{13}{29} = \frac{13}{17} \]
(b) \[ \frac{P(G \cap F)}{P(F)} = \frac{6}{29} = \frac{6}{24} \]

3. (a) \[ \frac{P(E \cap F)}{P(F)} = 0.1 \]
(b) \[ \frac{P(F \cap E)}{P(E)} = \frac{0.4}{0.5} = \frac{4}{5} \]

4. Tree

(a) \[ 0.4 \times 0.7 = 0.28 \]
(b) 0.72
(c) \[ 0.1 \times 0.6 + 0.4 \times 0.7 + 0.5 \times 0.72 = 0.7 \]
(d) \[ 0.1 + 0.4 \times 0.3 + 0.5 \times 0.28 = 0.36 \]

or \[ 0.1 + 0.1 \times 0.4 + 0.4 \times 0.3 + 0.5 \times 0.28 - 0.1 \times 0.4 = 0.36 \]
(e) \[ \frac{P(C \cap E)}{P(E)} = \frac{0.5 \times 0.28}{0.1 \times 0.6 + 0.4 \times 0.3 + 0.5 \times 0.72} = \frac{0.36}{0.7} = \frac{18}{35} \]
(f) \[ P(B) = 0.4 \]
\[ P(E) = 0.7 \]
\[ P(B \cap E) = 0.4 \times 0.7 = 0.28 \]
\[ P(B) \times P(E) = 0.4 \times 0.7 = 0.28 \]

Since \[ P(B \cap E) = P(B) \times P(E) \] then E and B are independent.

(g) \[ P(A) = 0.1 \]
\[ P(E) = 0.7 \]
\[ P(A \cap E) = 0.1 \times 0.7 = 0.07 \]
\[ P(A) \times P(E) = 0.1 \times 0.6 = 0.06 \]

Since \[ P(A \cap E) \neq P(A) \times P(E) \] then E and A are not independent.

5. \[ P(1^{st}C|2^{nd}C) = \frac{\frac{13}{52} \times \frac{12}{51} + \frac{39}{52} \times \frac{13}{51}}{\frac{13}{52} + \frac{39}{52}} = \frac{12}{51} \]

or you could do the shortcut shown in class.
6. This has to be done by a tree.

\[ P(1^{st} A | 2^{nd} D) = \frac{1}{52} \times \frac{12}{51} + \frac{3}{52} \times \frac{13}{51} + \frac{12}{52} \times \frac{12}{51} + \frac{36}{52} \times \frac{13}{51} \]

\[ P(1^{st} A | 2^{nd} D) = \frac{1}{13} \]

7. \(0.12 \times 0.96 \times 0.9 + 0.88 \times 0.04 \times 0.9 + 0.88 \times 0.96 \times 0.1 = 0.21984\)

8. The tree for this problem

(a) \(P(\text{rent}) = 0.3 \times 0.1 + 0.5 \times 0.2 + 0.15 \times 0.7 + 0.05 \times 0.95 = 0.2825\)
(b) \(P(\text{own} \cap \text{husband}) = 0.5 \times 0.8 = 0.4\)
(c) \(P(\text{w} | \text{rent}) = \frac{0.15 \times 0.7}{0.2825} = 0.37168\)

9. The tree for this problem
(a) \( P(A) = 0.5 \times 0.02 + 0.35 \times 0.05 + 0.15 \times 0.12 = 0.0455 \)

(b) \( P(M | A) = \frac{0.35 \times 0.05}{0.0455} = 0.3846 \)

(c) \( 0.15 \times 0.88 = 0.132 \)