Homework 7 Key

3.5 (19, 20)
3.6 (18-20, 37-42)
3.7 (14a-d)

Section 3.5

20)

outcome	1, 2, 3	4, 5	6
probability	.5	.33	.17
value	50	-25	-90

$$EV = (.5)(50) + (.33)(-25) + (.17)(-90)$$

$$= 1.45$$

Since the expected value of playing is positive, you should play the game

Section 3.6

18a) $F = \{5\}$

$p(F) = \dfrac{1}{6}$

b) $E = \{2,4,6\}$

$E \cap F = \emptyset$

$P(F \mid E) = \dfrac{n(E \cap F)}{n(E)} = \dfrac{0}{3} = 0$

c) $O = \{1, 3, 5\}$

$p(F \mid O) = \dfrac{n(E \cap O)}{n(O)} = \dfrac{1}{3}$

d) $p(O \mid F) = \dfrac{n(F \cap O)}{n(F)} = \dfrac{1}{1} = 1$
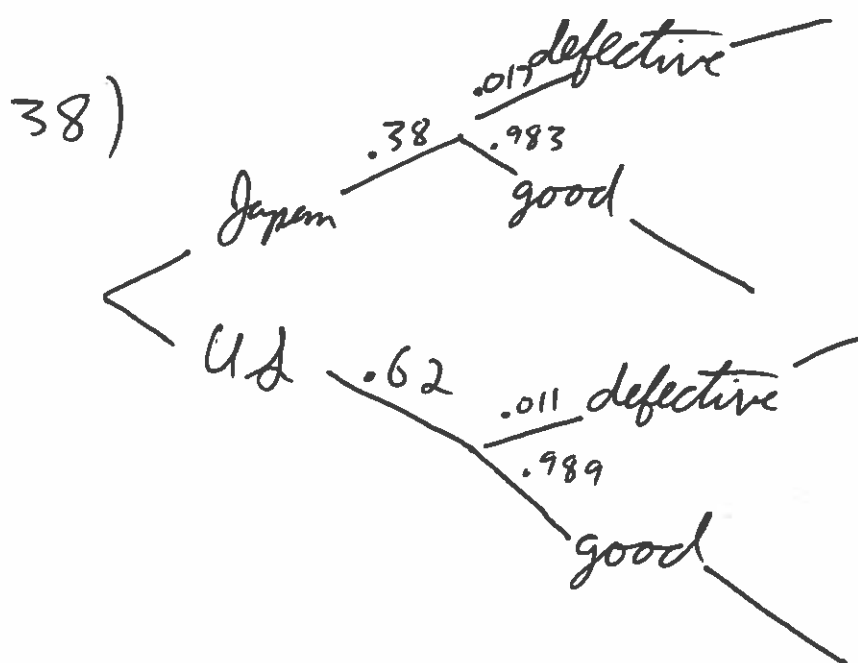
20a) $T = \{(6,6)\}$

$p(T) = \dfrac{1}{36}$

b) $E = \{x \mid x \text{ is a roll with an even sum}\}$

$p(T \mid E) = \dfrac{n(T \cap E)}{n(E)} = \dfrac{1}{18}$

c) $O = \{x \mid x \text{ is a roll with an odd sum}\}$

$p(T \mid O) = \dfrac{n(T \cap O)}{n(O)} = \dfrac{0}{18} = 0$

d) $p(E \mid T) = \dfrac{n(T \cap E)}{n(T)} = \dfrac{1}{1} = 1$

38)

$$.38 \quad \text{Japan} \quad \begin{cases} .017 \text{ defective} \\ .983 \text{ good} \end{cases}$$

$$.62 \quad \text{US} \quad \begin{cases} .011 \text{ defective} \\ .989 \text{ good} \end{cases}$$

The probability that a chip is defective and made in the US is $.62 \cdot .011 = .00682$

40) The probability that a chip is good is $(.38)(.983) + (.62)(.989) \approx .987$

42a) $M = \{ x \mid x \text{ is a male voter} \}$

$O = \{ x \mid x \text{ voted for Obama} \}$

$$P(M \mid O) = \frac{P(M \cap O)}{P(O)} = \frac{.21}{.5} = .42$$

b) $F = \{ x \mid x \text{ is a female voter} \}$

$$P(F \mid O) = \frac{P(F \cap O)}{P(O)} = \frac{.29}{.5} = .58$$

c) Obama received more voter from female voters than from male voters.

Section 3.7

14a) $X = \{(1,5), (2,4), (3,3), (4,2), (5,1)\}$

$$P(X) = \frac{n(X)}{n(S)} = \frac{5}{36}$$

b) $E = \{x \mid x \text{ is a roll with an even sum}\}$

$$P(X \mid E) = \frac{n(X \cap E)}{n(E)} = \frac{5}{18}$$

c) X and E are not independent because $P(X \mid E) \neq P(X)$

d) X and E are not mutually exclusive because $X \cap E \neq \emptyset$