2.3

2

$$P(A) = .5$$
$$P(A \cap B^C) = .4$$
$$= P(A)P(B^c) \qquad \text{A and B are assumed to be independent}$$
$$\Rightarrow$$
$$.4 = .5 * (1 - P(B))$$
$$1 - \frac{.4}{.5} = P(B)$$
$$.2 = P(B)$$

6

$$P(A \cap B) = P(A)P(B|A)$$
$$P(A) = .056$$
$$P(B|A) = .027$$
$$\Rightarrow$$
$$P(A \cap B) = .056 * .027$$
$$= .001512$$

10

  a .3

  b .2

  c

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$
$$= \frac{.1}{.3}$$
$$= .\overline{3}$$

  d

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$
$$= \frac{.1}{.2}$$
$$= .5$$

e

$$P(A^c|B) = \frac{P(A^c \cap B)}{P(B)}$$
$$= \frac{.2}{.3}$$
$$= .\bar{6}$$

f

$$P(A^c|B) = \frac{P(A^c \cap B)}{P(B)}$$
$$= \frac{.1}{.2}$$
$$= .5$$

12

a

$$P(A \cap B) = P(A)P(B)$$
$$= .2 * .4$$
$$= .08$$

b

$$P(S \cap T) = P(S \cap T)$$
$$= \frac{.3}{.2}$$
$$= .06$$

18

$$P(\text{Black car}| \text{ Small car}) = \frac{P(\text{Black car} \cap \text{Small car})}{P(\text{Small car})}$$
$$P(\text{Small car}) = \frac{340}{750}$$
$$= .45$$
$$P(\text{Black car} \cap \text{Small car}) = \frac{71}{750}$$
$$= .094$$
$$\Rightarrow$$
$$P(\text{Black car}|\text{Small car}) = \frac{.094}{.45}$$
$$= .21$$

20

a

$$P(G \cap C) = P(G)P(C|G) = .7 * .005 = .0035$$

b

$$P(C) = P(G \cap C) + P(M \cap C) + P(P \cap C)$$
$$= P(G)P(C|G) + P(M)P(C|M) + P(P)P(C|P)$$
$$= .7 * .005 + .2 * .01 + .1 * .025$$
$$= .008$$

c

$$P(G|C) = \frac{P(G \cap C)}{P(C)}$$
$$= \frac{.0035}{.008}$$
$$= .4375$$

34

$$P(A^C) = .1, P(B^C) = .05, P(C^c) = .1, P(D^c) = .2$$

$$P(\text{sub } 1 = P(A \cap B)$$
$$= P(A)P(B)$$
$$= (1 - P(A^C)) * ((1 - P(B^C))$$
$$= (.9)(.95)$$
$$= .855$$

$$P(\text{sub } 2) = 1 - (1 - .1)(1 - .2)$$
$$= .980$$

$$P(\text{system}) = 1 - (1 - .980)(1 - .855)$$
$$= .997$$