Practice Problems

2.124 A = all 5 cards are of the same suit

$$P(A) = \frac{4\binom{13}{5}}{\binom{52}{5}}$$

2.125 B = full house, 2 of a kind and 3 of a kind

$$P(B) = \frac{\binom{13}{2}\binom{4}{2}\binom{4}{3}}{\binom{52}{5}}$$

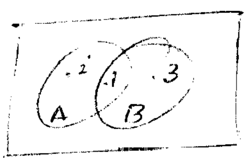
2.126 P(each supplier has at least one component tested)

= P(2 from A or 2 from B or 2 from C)

= P(2 from A) + P(2 from B) + P(2 from C)

$$= \frac{\binom{3}{2}\binom{4}{1}\binom{5}{1}}{\binom{12}{4}} + \frac{\binom{3}{1}\binom{4}{2}\binom{5}{1}}{\binom{12}{4}} + \frac{\binom{3}{1}\binom{4}{1}\binom{5}{2}}{\binom{12}{4}}$$

2.127



a) P(neither) = $1 - (.20 + .10 + .30) = .40$

b) P(at least one) = 1 − P(none) = $1 - .40 = .60$

c) $$P(A \cap B \mid B) = \frac{P[(A\cap B)\cap B]}{P(B)} = \frac{P(A\cap B)}{P(B)}$$

$$= \frac{.1}{.1+.3} = \frac{.1}{.4} = .25$$

2.131 a) $P(A) = .25 + .10 + .05 + .10 = .50$

b) $P(A \cap B) = .10 + .05 = .15$

c) $P(A \cap B \cap \bar{C}) = .10$

d) $P(\bar{A} \cup \bar{B} \mid C) = \dfrac{P[(\bar{A} \cup \bar{B}) \cap C]}{P(C)}$

$= \dfrac{P[(\bar{A} \cap C) \cup (\bar{B} \cap C)]}{P(C)} = \dfrac{P(\bar{A} \cap C) + P(\bar{B} \cap C) - P(\bar{A} \cap \bar{B} \cap C)}{P(C)}$

$= \dfrac{.25 + .25 - .15}{.4} = .875$

2.132 a) i. $89,761 / 100,761 = .89$

ii $47,038 / 100,761 =$

iii $P(\text{motor vehicle} \mid (15\text{-}24))$

$= \dfrac{P(\text{motor vehicle and } 15\text{-}24)}{P(15\text{-}24)}$

$= \dfrac{16,650 / 100,761}{24,316 / 100,761} = .68$

iv $P(\text{drowning} \mid \text{not motor vehicle and 34 or less})$

$= \dfrac{1060 + 2090 + 1050 + 920}{19,935} = .25$

b) No, need total US population size

2.137 RO_i = relay i open, RC_i = relay i closed, $i = 1,2,3,4$

A $P(\text{current flows}) = 1 - P(\text{current doesn't flow})$

$= 1 - P[(RO_1 \cap RO_2) \cup (RO_3 \cap RO_4)]$

$= 1 - \{P(RO_1 \cap RO_2) + P(RO_3 \cap RO_4) - P(RO_1 \cap RO_2 \cap RO_3 \cap RO_4)\}$

$= 1 - \{(.1)^2 + (.1)^2 - (.1)^4\} = 1 - .0199 = .9801$

B $P(\text{current flows}) = P[(RC_1 \cap RC_3) \cup (RC_2 \cap RC_4)]$

$= P(RC_1 \cap RC_3) + P(RC_2 \cap RC_4) - P(RC_1 \cap RC_2 \cap RC_3 \cap RC_4)$

$= (.9)^2 + (.9)^2 - (.9)^4 = .9639$

A is better.