

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

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

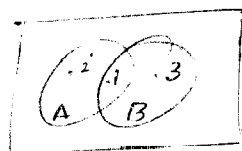
2.126  $P(\text{each supplier has at least one component tested})$

$$= P(2 \text{ from A or 2 from B or 2 from C})$$

$$= P(2 \text{ from A}) + P(2 \text{ from B}) + P(2 \text{ from C})$$

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

2.127



$$a) P(\text{neither}) = 1 - (.20 + .10 + .30) = .40$$

$$b) P(\text{at least one}) = 1 - P(\text{none}) = 1 - .40 = .60$$

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

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

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

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

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

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

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

$$= \frac{.25 + .25 - .15}{.1} = .875$$

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

ii.  $47,038 / 100,761 =$

iii.  $P(\text{motor vehicle} | (15-24))$   
 $= \frac{P(\text{motor vehicle and } 15-24)}{P(15-24)}$

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

iv.  $P(\text{drowning} | \text{not motor vehicle and } 34 \text{ or less})$   
 $= \frac{1060 + 2090 + 1050 + 920}{19,935} = .25$

b) No, need total US population size

2.137  $RO_i = \text{relay } i \text{ open}, RO_i = \text{relay } i \text{ closed}, i=1,2,3,4$

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.