Ex 7.1

12/. If spinner 3 is spun once and then spinner 2 is spun twice then the sample space is (1)

$S = \{1AA, 1AB, 1AC, 1BA, 1BB, 1BC, 1CA, 1CB, 1CC, 2AA, 2AB, 2AC, 2BA, 2BB, 2BC, 2CA, 2CB, 2CC, 3AA, 3AB, 3AC, 3BA, 3BB, 3BC, 3CA, 3CB, 3CC, 4AA, 4AB, 4AC, 4BA, 4BB, 4BC, 4CA, 4CB, 4CC\}$

18/ Expt: Toss 2 dice and then a coin

$n(S) = \begin{pmatrix}\text{no. of ways}\\ \text{to roll one die}\end{pmatrix} \times \begin{pmatrix}\text{no. of ways to}\\ \text{roll one die}\end{pmatrix} \times \begin{pmatrix}\text{no. of ways to}\\ \text{toss a coin}\end{pmatrix}$

$= 6 \times 6 \times 2$

$= \underline{\underline{72}}$

24/ If the coin is known to be fair, assignment 1 should be used because all outcomes would be equally likely.

Ex 7.2

30/ (c) A and B are mutually exclusive

$P(A) = 0.35$; $P(B) = 0.60$

$$P(\overline{A \cup B}) = 1 - P(A \cup B)$$
$$= 1 - (0.35 + 0.60)$$
$$= \underline{\underline{0.05}}$$

(a) $P(A \cap B) = \underline{\underline{0}}$

36/ Let A be the event that material E is short
B " " " " F is short

then

$P(A) = 0.06$; $P(B) = 0.04$

$P(A \cap B) = 0.02$

$$P(\underbrace{\text{being short of either material}}) = P(A \cup B)$$
$$= 0.06 + 0.04 - 0.02$$
$$= \underline{\underline{0.08}}$$

38/ (a) $P(\text{at most 2 people in line})$

$$= P(\underbrace{\text{exactly}} \text{ 0 in line}) + P(\underbrace{\text{exactly}} \text{ 1 in line}) + P(\underbrace{\text{exactly}} \text{ 2 in line})$$
$$= 0.10 + 0.15 + 0.20$$
$$= \underline{\underline{0.45}}$$

Ex 7.3

14/ P(In a group of 6 people, at least 2 were born in the same month)

$= 1 - P(\text{no two were born in the same month})$

$= 1 - \dfrac{P(12,6)}{12^6}$

$= 1 - \dfrac{665,280}{2,985,984}$

$= 1 - 0.2228$

$= \underline{0.7772}$

35/ Expt : Select 5 cards from a deck of 52 cards

S = all possible combinations of 5 cards

(a) E = all combinations with 5 hearts

$$P(E) = \frac{C(13,5)}{C(52,5)} = \frac{\frac{13!}{5!8!}}{\frac{52!}{5!47!}} = \frac{1287}{2598960} \approx \underline{0.000495}$$

(b) E = all combinations with exactly 4 spades

$$P(E) = \frac{C(13,4)\cdot C(39,1)}{C(52,5)} = \frac{715\times 39}{2598960} \approx \underline{0.0107}$$

(c) E = all combinations with exactly 2 clubs

$$P(E) = \frac{C(13,2)\,C(39,3)}{C(52,5)} = \frac{78\times 9139}{2598960} \approx \underline{0.2743}$$

26/ Expt: 30 transformers are chosen at random from 50.
S = all the different ways of choosing 30 transformers
A = the event that all 30 are non-defective

$$P(A) = \frac{C(A)}{C(S)}$$

$$= \frac{C(40,30)}{C(50,30)}$$

$$= \underline{\underline{0.000018}}$$

38/ Expt: Assign 5 numbers (1 to 8) to the 5 passengers

S = all possible ways of assigning 5 floor numbers to 5 passengers
A = the event that no two passengers get assigned the same number

$$P(A) = \frac{C(A)}{C(S)}$$ because all simple events are equally likely

$$= \frac{P(8,5)}{8^5}$$

$$= \underline{\underline{0.2051}}$$

5

Ex 7.4

20/. $P(D) = P(A \cap D) + P(B \cap D)$

$= P(A) \cdot P(D|A) + P(B) \cdot P(D|B)$

$= (0.7)(0.1) + (0.3)(0.8)$

$= 0.07 + 0.24$

$= 0.31$

12/. $P(F) = 0.6$, $P(E) = 0.5$, $P(E \cap F) = 0.3$

$P(F|E) = \frac{P(E \cap F)}{P(E)} = \frac{0.3}{0.5} = 0.60$

$P(E|F) = \frac{P(E \cap F)}{P(F)} = \frac{0.3}{0.6} = 0.50$

38/. Expt: A card is drawn at random from a deck of 52 cards

(a) P (the card is a black jack) $= 2/52 = 1/26$

(b) P (the card is a black jack | a jack was picked) $= 2/4 = 1/2$

(c) P (the card is a black jack | a black card was picked) $= 2/26 = 1/13$

Ex 7.4

50%

$P(G \cap I) = 0.32$

$P(I) = 0.76$

$$P(G|I) = \frac{P(G \cap I)}{P(I)}$$

$$= \frac{0.32}{0.76}$$

$$= \underline{\underline{0.4211}}$$

38/ (a) $P(\text{the card is a black jack}) = \frac{2}{52} = \underline{\underline{\frac{1}{26}}}$

(b) $P(\text{the card is a black jack} \mid \text{the card is a jack})$

$$= \frac{2}{4}$$

$$= \underline{\underline{\frac{1}{2}}}$$

(c) $P(\text{the card is a black jack} \mid \text{the card is a black card}$

$$= \frac{2}{26}$$

$$= \underline{\underline{1/13}}$$

4 / $P(1^{st} \text{ card is red and the second is black})$

$= P(1^{st} \text{ card is red}) \cdot P(2^{nd} \text{ is black} \mid 1^{st} \text{ is red})$

$$= \frac{1}{2} \cdot \frac{26}{51}$$

$$= \underline{\frac{13}{51}}$$

Ex 7.4

82/ Let R be the event that a voter is a Republican
V " " " " " " voted for the Democratic candidate

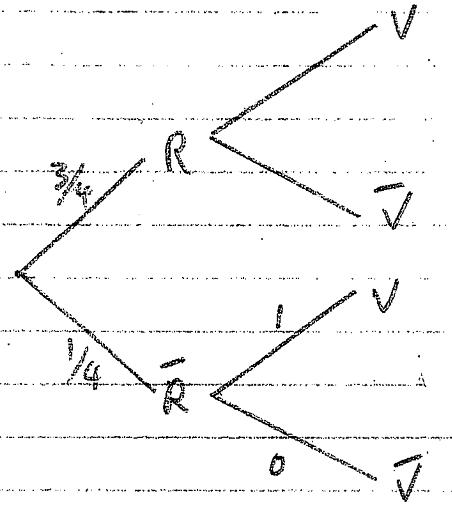
then

$P(R) = 3/4$, $P(V|R) = ??$ $P(V) = 5/9$

$P(\bar{R}) = 1/4$, $P(V|\bar{R}) = 1$

find $P(R)$ and $P(R|V)$

$$P(R) = \underline{3/4}$$



$$P(\bar{R} \cap V) = P(\bar{R}) \times P(V|\bar{R})$$
$$= \frac{1}{4} \times 1$$
$$= \frac{1}{4}$$

Since

$$P(V) = P(R \cap V) + P(\bar{R} \cap V)$$
$$P(R \cap V) = 5/9 - 1/4$$
$$= 11/36$$

$$\therefore P(R|V) = \frac{P(R \cap V)}{P(V)}$$
$$= \frac{11/36}{5/9}$$
$$= \underline{\frac{11}{20}}$$

Ex 7.4

85/ Let T be the event that an applicant passes the test

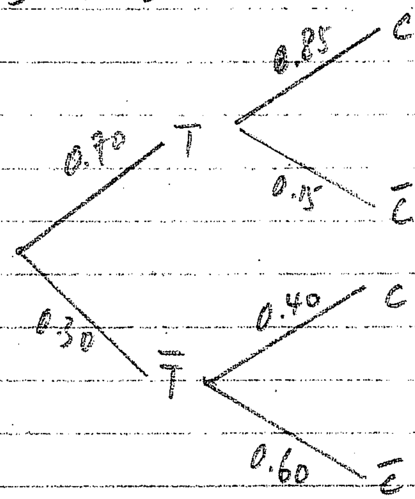
C " " " " " completes training successfully.

then

$P(T) = 0.70$ $\quad P(C|T) = 0.85$

$P(\bar{T}) = 0.30$ $\quad P(C|\bar{T}) = 0.40$

Find $P(C)$



$P(T \cap C) = P(T) \cdot P(C|T)$

$= 0.7 \times 0.85$

$= 0.595$

$P(\bar{T} \cap C) = P(\bar{T}) \cdot P(C|\bar{T})$

$= 0.30 \times 0.40$

$= 0.12$

$\therefore \; P(C) = P(T \cap C) + P(\bar{T} \cap C)$

$= 0.595 + 0.12$

$= \underline{0.715}$ or 71.5%