Assignment 1

1) A bag contains balls that are either red or blue and either dull or shiny. What is the sample space when a ball is chosen from the bag?

2) If a card is chosen at random from a pack of cards, what is the probability that it is an ace?

3) If $P(A) = 0.5$, $P(A \cap B) = 0.1$, and $P(A \cup B) = 0.8$, what is $P(B)$?

4) An experiment has three outcomes, I, II, and III. If outcome I is twice as likely as outcome II, and outcome II is three times as likely as outcome III, what are the probability values of the three outcomes?

5) A company's advertising expenditure is either low with probability 0.28, average with probability 0.55, or high with probability p. What is p?

6) Consider the sample space with outcomes a, b, c, d, and e. Calculate:

(a) P(b)   (b) P(A)   (c) P(A')   by using the following figure
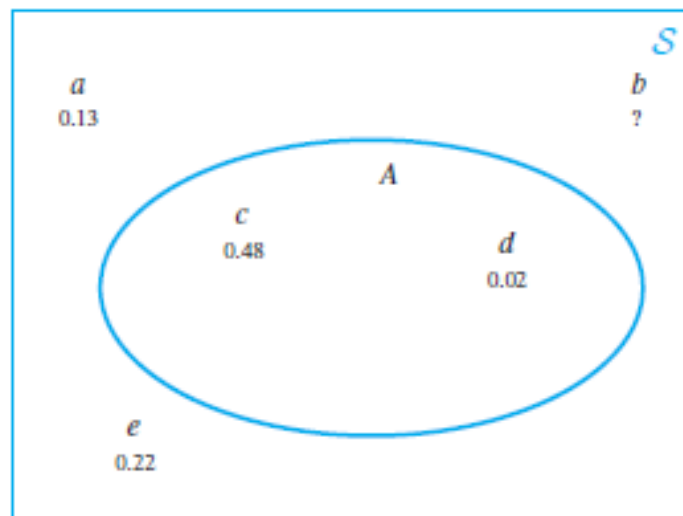
7) Consider the sample space with outcomes a, b, c, d, e, and f. If $P(A) = 0.27$, calculate:

(a) P(b)   (b) P(A')   (c) P(d)   by using the following figure
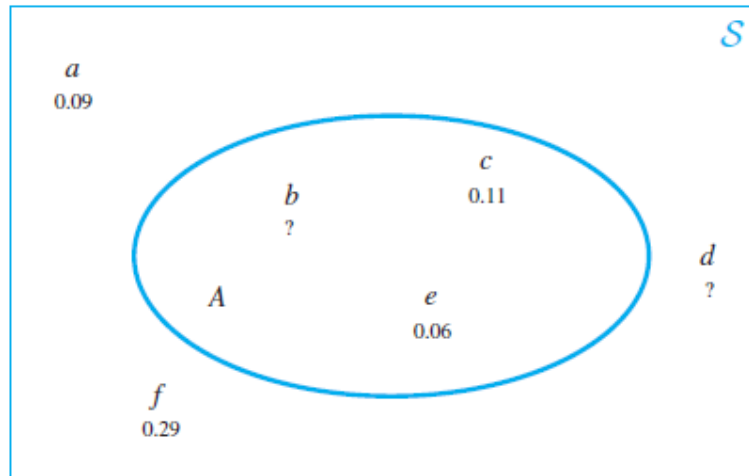
8) Three types of batteries are being tested, type I, type II, and type III. The outcome (I, II, III) denotes that the battery of type I fails first, the battery of type II next, and the battery of type III lasts the longest. The probabilities of the six outcomes are given in the following figure. What is the probability that

(a) the type I battery lasts longest?

(b) the type I battery lasts shortest?

(c) the type I battery does not last longest?

(d) the type I battery lasts longer than the type II battery?
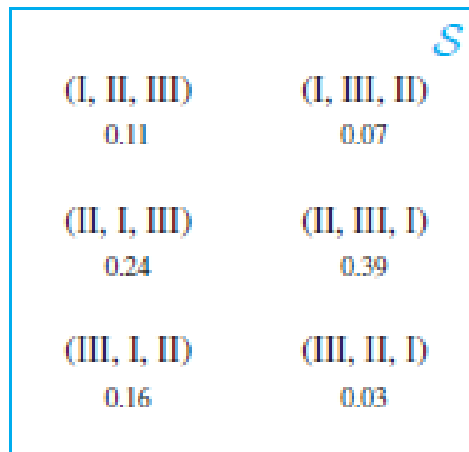
9) A factory has two assembly lines, each of which is *shut down (S)*, at *partial capacity (P)*, or at *full capacity (F)*.

The sample space is given in the following, where, for example, *(S, P)* denotes that the first assembly line is shut down and the second one is operating at partial capacity.

		S
(S, S)	(S, P)	(S, F)
0.02	0.06	0.05
(P, S)	(P, P)	(P, F)
0.07	0.14	0.20
(F, S)	(F, P)	(F, F)
0.06	0.21	0.19

What is the probability that

(a) both assembly lines are shut down?

(b) neither assembly line is shut down?

(c) at least one assembly line is at full capacity?

(d) exactly one assembly line is at full capacity?

What is the complement of the event in part (b)? What is the complement of the event in part (c)?

10) If $P(A) = 0.4$ and $P(A \cap B) = 0.3$, what are the possible values for $P(B)$?

11) A card is drawn at random from a pack of cards. A is the event that a heart is obtained, B is the event that a club is obtained, and C is the event that a diamond is obtained. Are these three events mutually exclusive? What is $P(A \cup B \cup C)$? Explain why $B \subset A'$

12) A bag contains 200 balls that are either red or blue and either dull or shiny. There are 55 shiny red balls, 91 shiny balls, and 79 red balls. If a ball is chosen at random, what is the probability that it is either a shiny ball or a red ball? .

13) A ball is chosen at random from a bag containing 150 balls that are either red or blue and either dull or shiny. There are 36 red shiny balls and 54 blue balls. What is the probability of the chosen ball being shiny conditional on it being red?