

***INTRODUCTORY MATHEMATICAL STATISTICS***  
***(STAT2001/6039)***

**Tutorial 1**

**Problem 1**

Vehicles arriving at an intersection can turn left, turn right, or continue straight ahead. Suppose that an experiment consists of observing the movement of one vehicle at this intersection.

- (a) List the elements of the sample space.
- (b) Attach reasonable probabilities to these elements, assuming that all possible outcomes are equally likely.
- (c) Find the probability that the vehicle turns, under the probabilistic model in (b). Is the said assumption reasonable?

**Problem 2**

A manufacturing company has two retail outlets.

It is known that 20% of potential customers buy products from Outlet I alone, 10% buy from both I and II, and 40% buy from neither.

Let  $A$  denote the event that a potential customer, randomly chosen, buys from Outlet I, and  $B$  the event that the customer buys from Outlet II.

Find the following probabilities:

- (a)  $P(A)$
- (b)  $P(B)$
- (c)  $P(A \cup B)$
- (d)  $P(\overline{A}\overline{B})$ .

**Problem 3**

According to *Webster's New Collegiate Dictionary*, a divining rod is a "forked rod believed to indicate [divine] the presence of water or minerals by dipping downward when held over a vein."

To test the claims of a divining rod expert, skeptics bury six cans in the ground, three empty and three filled with water. The expert is led to the six cans and told that three contain water. He uses the divining rod to test each of the six cans and decide which three contain water.

Suppose that the divining rod is completely useless for locating water.

Find the probability that the expert will correctly identify:

- (a) all three of the cans containing water
- (b) at least two of the three cans containing water.

**Problem 4**

For a certain style of new automobile, the colours blue, white, black and green are in equal demand. Three successive orders are placed for automobiles of this style.

Find the probability that:

- (a) one blue, one white and one green are ordered
- (b) two blues are ordered
- (c) at least one black is ordered
- (d) exactly two of the orders are for the same colour.