**University of Technology Sydney**
**School of Mathematical and Physical Sciences**

Probability and Random Variables (37161) –
Class 1 Preparation Work

1. Two fair regular six-sided dice are rolled. The sample space, $\Omega$, therefore contains 36 equally likely possible outcomes $\Omega = \{11,12,13,14,15,16,21,22,\ldots,64,65,66\}$

i) What is the probability that the second die shows a larger number than the first?

ii) The values showing on the two dice are added. What is the probability that the sum of the values is 8?

iii) The values showing on the two dice are multiplied. What is the probability that the product of the two values is a multiple of 10?

2. In order to enrol in a university subject, students must have completed at least one of prerequisite subject A or prerequisite subject B.

   35% of enrolling students have passed both subject A and subject B. 80% of students have passed subject A.

   Draw a Venn diagram to represent this problem and find the proportion of students who have passed subject B.

3. A random experiment consists of selecting one person at random. The sample space for this experiment is the set of all living people.

Consider the following events:

$X_1$: The set of all people living in Australia
$X_2$: The set of all people enrolled at UTS
$X_3$: The set of all people enrolled in a university course
$X_4$: The set of all adults
$X_5$: The set of all people living in Australia or New Zealand
$X_6$: The set of all children living in New Zealand
$X_7$: The set of all adults living in Australia
$X_8$: The set of all children living in Australia

i) Which pairs of events are mutually exclusive?

ii) Which events are subsets of another event?

iii) Which events can be written as the union of two other events?

iv) Which events can be written as the intersection of two other events?

v) Which event can also be expressed as $X_1^c \cap X_4^c \cap X_5$?

(Hint for v: Think through the meanings of unions, intersections and complements in terms of NOT, AND and OR logical operations.)