Australian National University

RESEARCH SCHOOL OF FINANCE, ACTUARIAL STUDIES AND APPLIED STATISTICS

INTRODUCTORY MATHEMATICAL STATISTICS (STAT2001)

Mid-Semester Examination – First Semester 2015

Time allowed: *60 minutes*
Reading time: *5 minutes*
Permitted materials: *No restrictions*

Every student should attempt all four problems.
Each problem is worth five marks. The exam is out of 20 marks.
Show all working and present each final numerical answer correct to at least four significant digits. Draw a box around each final answer.

Problem 1 ***(5 marks)***

A box contains seven balls, of which three are red and four are white. Balls are selected from the box, one by one and without replacement, until a total of two red balls have been selected. Let X be the total number of balls selected. Derive and sketch the probability mass function of X. Also calculate the mean and variance of X.

Problem 2 ***(5 marks)***

A standard six-sided die is going to be rolled 12 times. Find the (single) probability that each of the six possible outcomes (1, 2, 3, 4, 5 and 6) will come up at least once.

Problem 3 ***(5 marks)***

A committee of 9 persons was selected, randomly and without replacement, from 27 persons consisting of 7 men and 20 women. Then, a sub-committee of 4 persons was selected, randomly and without replacement, from the 9 persons on the committee. Find the probability that there are at least two men on the committee, given that there is at least one man on the sub-committee.

Problem 4 ***(5 marks)***

Ann and Bob are about to play a game. They will take turns rolling a standard six-sided die until an even number comes up twice in a row. (The same even number must come up twice in a row for the game to end.) The winner will be the last person to roll. Ann will roll first. Find the probability that Ann will win.