Australian National University

RESEARCH SCHOOL OF FINANCE, ACTUARIAL STUDIES AND STATISTICS

Mid-Semester Examination – First Semester 2016

INTRODUCTORY MATHEMATICAL STATISTICS (STAT2001)

PRINCIPLES OF MATHEMATICAL STATISTICS (STAT6039)

Study Period: 5 minutes

Time Allowed: 55 minutes

Permitted Material: No restrictions

- *All students should attempt all parts of all five problems.*
- *Each problem is worth 10 marks. The exam is out of 50 marks.*
- *Show all working and present all final numerical results correct to four significant digits. Draw a box around each final answer.*

Problem 1 ***[10 marks]***

A stack of eleven cards contains two red cards, six blue cards and three black cards. A random sample of four cards is drawn from the stack, without replacement.

Find the probability that the sample contains at least one red card and at least one blue card, given that the sample contains at least one black card.

Problem 2 ***[10 marks]***

Four standard dice were rolled. Then each die that did not come up six (if any) was rolled again. Following this, exactly one of the four dice showed six on its upper face.

Find the probability that at least one of the four dice came up six on its initial roll.

Problem 3 ***[10 marks]***

A random variable with possible values 0, 1 and 2 has mean 1.2 and variance 0.25.

Find the probability that this random variable takes on the value 0.

Problem 4 ***[10 marks]***

A random variable has the moment generating function $m(t) = (2e^{-t} - 1)^{-1}$.

Find the probability that this random variable takes on a value greater than 10.

Problem 5 ***[10 marks]***

Ann and Bob are about to play a game, taking turns and starting with Ann, as follows. The game begins with a box that contains two red cards and three green cards (only). On each turn, the player whose turn it is randomly draws one card from the box. If that card is green, it is returned to the box; and if that card is red, it is burnt. As soon as both red cards have been burnt, the game ends and the player whose turn it is wins.

Find the probability that Ann will win the game.

END OF EXAMINATION