RESEARCH SCHOOL OF FINANCE, ACTUARIAL STUDIES

AND STATISTICS

INTRODUCTORY MATHEMATICAL STATISTICS

PRINCIPLES OF MATHEMATICAL STATISTICS

(STAT2001/6039)

Assignment 1 (2017)

- *Your solutions to the assignment should be placed in the appropriate box in the FAS School foyer by the due time and date (as provided on Wattle).*
- *Attach a cover sheet (as provided on Wattle) which has your ANU ID number.*
- *The assignment is out of 100 and is worth 10% of your overall course mark.*
- *The assignment is to be done alone. Marks may be deducted for any copying.*

Problem 1   *(Total 20 marks)*

A stack of cards contains four Aces, three Kings, two Queens and six other cards. Seven cards are randomly drawn from the stack, without replacement.

(a) Find the probability that the drawn cards contain at least one Ace.

(b) Find the probability that the drawn cards contain exactly two Aces if it is known that they contain no Kings or Queens.

Problem 2   *(Total 20 marks)*

Homer and Marge are about to play a game with the following rules. They take turns rolling a standard fair die, starting with Homer. The game ends when someone rolls a 5 or 6. That person wins the game.

(a) Find the probability that Homer will win the game.

(b) Suppose that the game ends in a draw if ever two 1s come up in a row. With this change to the rules, find the probability that Homer will win the game.

Problem 3   *(Total 30 marks)*

A fair white die has 1, 2, 3, 4, 5, 5 printed on its 6 faces, and a fair red die has
1, 1, 2, 3, 4, 5 printed on its 6 faces.

(a) The two dice are rolled together once and the number coming up on each die is
observed. Write down all the sample points for this experiment, and assign a
reasonable probability to each one. Then use the sample point method to find the
probability that the total of the two numbers coming up is less than 6.

(b)   The white die is rolled once and the red die is rolled twice. Use the event
composition method to find the (single) probability that the number coming up on the
white die is less than 4, or neither of the numbers coming up on the red die is 1.

(c) The two dice are rolled together repeatedly until different numbers come up. Find
the probability that the total of the numbers coming up on the final roll of the two dice
is exactly 6.

Problem 4   *(Total 20 marks)*

A ballroom contains four married couples (four men and their four wives). The
gentlemen are to be paired up randomly with the ladies, one man to each woman.
After one dance, the eight people are to be separated, except for the married couples
that happen to be together by chance. The separated people will then be paired up
again randomly for the second dance, again one man to each woman.

(a) Find the probability that exactly two married couples will be dancing together on
the second dance.

(b)   Suppose that exactly one married couple are dancing together on the second
dance. What is the probability that no man was dancing with his wife on the first
dance?

Problem 5   *(Total 10 marks)*

If two possible events are disjoint, is it possible that they are independent? Justify
your answer. (Note: A possible event is one whose probability of occurring is not
zero.)