UNIVERSITY OF WARWICK
DEPARTMENT OF ECONOMICS

Exercise Sheet 2: Probability

1. The Government Economic Service is concerned about the Economics and Econometric skills of its employees. 40% of these employees signed up to Economic classes and 50% to Econometric classes. Of those signing up for Economic classes, 30% signed up for Econometric classes.

(a) What is the probability that a randomly selected employee signed up for both classes?

(b) What is the probability that a randomly selected worked who signed up for the econometrics classes also signed up for the Economics classes?

(c) What is the probability that a randomly chosen worker signed up for at least one of these two classes?

(d) Are the two events statistically independent?

2. From the university records for students who left university in 1993, we know the A-level points score of all students taking A-levels and their degree classification. The table below gives proportions of students in each of the classifications, by A-level category and degree class:

Degree class	A-level points score				
	22	24	26	28	30
First	0.02	0.01	0.01	0.01	0.03
Upper second	0.20	0.06	0.06	0.05	0.06
Lower second	0.19	0.03	0.03	0.02	0.01
Third	0.13	0.02	0.02	0.02	0.02

(a) Find the probability that a randomly chosen student obtained at least an upper second class degree.

(b) Find the probability that a randomly chosen student had fewer than 24 A-level points

(c) Find the probability that a randomly chosen student who obtained more than 22 A-level points obtains at least an upper second class degree.

(d)   Find the probability that a randomly chosen student who obtained an upper second class degree had more than 22 A-level points.

(e)   Find the probability that a randomly chosen student who obtained an upper second class degree 28 A-level points or fewer.

3.   The alumni association at a leading UK university solicits donations by telephone. It is estimated that for any individual the probability of an instant donation was 0.05, 0.20 give no immediate donation, but a request for further information through mail and 0.75 have no interest. Mailed information is sent to all persons requesting it and 0.15 of these eventually give a donation. An operator makes a sequence of calls, which can be assumed to be independent.

(a)   What is the probability of a donation?

(b)   What is the probability that an instant credit card donation is immediately preceded by at least 4 no interest calls?

[Hint for this question you need to remember that:

$$a + ar + ar^2 + \ldots + ar^\infty = a/(1-r) \quad \text{for } r < 1]$$

(c)   What is the probability that the first call leading to a donation (either instant or eventually after a mailing) is immediately preceded by at least 4 no interest calls?