

COURSEWORK ASSIGNMENT

UNIT	CMPSMC2Y
ASSIGNMENT TITLE	Coursework 1
DATE SET	24-05-07
DATE AND TIME OF SUBMISSION	21-06-07
RETURN DATE	29-06-07
ASSIGNMENT VALUE	50 %
SET BY	GJJ
CHECKED BY	AJB

Aims

To re-enforce material presented in the lectures and to allow students the opportunity to try techniques on extended problems

Learning outcomes:

To improved understanding of the material by working individually at problems based on the lecture material.

Assessment criteria:

The student is expected to

1. Present solutions to all problems.
2. Giving full working that demonstrates the steps required to obtain the correct solution and the important principles used.
3. bear in mind that the logic of the solution is important.

As always, credit is given for a persuasive argument.

Description of assignment:

Solution of problems related to material in lectures.

Handing in Procedure:

Please submit your piece of coursework in one of the following the following ways

1. Email your solution to g.janacek@uea.ac.uk
2. Post your piece of coursework to

G.Janacek,
CMP,
UEA,
NR4 7TJ

Any piece of coursework which is submitted late must be submitted using the same procedure, will be subject to penalties unless an extension has been sought.

If you have any problems or queries please contact G.Janacek

1. In the game of craps a player throws two dice and observes the sum. If on his first throws a seven or an eleven he wins and if he throws a two, three or twelve he loses. Otherwise the sum he obtains (4,5,6,8,9,10) becomes his *point*. In order to win he must continue to throw and obtain his point before he throws a seven. If he throws a seven before his point, he loses. What is the probability of winning at craps? 20%

2. Suppose that $U_1, U_2, U_3, \dots, U_N$ are independent random variables each having the distribution

$$f(u) = 1 \quad 0 \leq u \leq 1$$

let $M = \max\{U_1, U_2, U_3, \dots, U_N\}$

- (a) Find the distribution of M 10%
- (b) Find the mean and variance of M 10%
3. At a London terminus 1400 commuters arrive to catch the 17.30 train. Observation reveals that 50 arrive before the platform gate is opened at 17.20 and that when the train leaves on time 70 will arrive too late.
- (a) Assuming normal arrival times find the mean and standard deviation. 5%
- (b) How many commuters will miss the train when it leaves two minutes late? 5%
4. The following is an extract from the CPS website

DNA: "The Prosecutor's Fallacy" The "fallacy" is to equate the rarity of the DNA profile to the likelihood of guilt. Expressing the statistical conclusion in the wrong terms may mislead the jury.

For example, the scientist's evidence states:

"The chances of finding the matching profiles if this semen (in the crime stain) had originated from a man in the general population other than and unrelated to the defendant is 1 in 5 million".

The prosecutor or judge translates this into any of the following statements;

the likelihood that the defendant is guilty is 5 million to 1 or; the likelihood that the defendant is innocent is 5 million to 1; the semen is 5 million times more likely to have come from the defendant than any other man; it is 5 million to 1 against that a man other than the defendant left the semen.

All the statements in the above paragraph are misleading and require evidence other than the scientist's finding to support them.

- Explain why the italicized statements are wrong. 10%

5. The data set below, gives the IQ scores (IQ) and the behavioral problem (BP) scores of children aged five, labeled according to whether or not their mothers had suffered a period of post-natal depression. Here

*D = depressed mother; ND = non-depressed mother.

What can you deduce from this data?

40%

M state	IQ	BP	M state	IQ	BP	M state	IQ	BP	M state	IQ	BP
ND	103	4	ND	110	4	ND	117	5	ND	118	2
ND	144	3	ND	117	7	D	99	13	ND	103	6
ND	124	12	D	139	6	ND	123	2	ND	107	3
ND	119	5	D	100	10	ND	99	8	ND	118	5
ND	124	9	ND	117	4	ND	118	4	D	123	2
ND	127	7	ND	89	11	ND	122	0	ND	117	5
ND	104	3	ND	96	5	D	84	10	D	102	5
ND	113	7	ND	125	9	ND	106	5	ND	115	7
D	96	3	D	111	5	ND	117	2	ND	110	6
ND	127	2	ND	127	9	ND	124	1	ND	119	4
ND	92	3	ND	118	4	D	101	6	ND	114	4
ND	103	3	ND	112	5	ND	100	4	ND	117	4
ND	124	6	ND	126	11	ND	141	4	ND	118	2
ND	128	8	ND	48	9	ND	114	7	ND	92	7
ND	99	4	ND	126	2	ND	124	7	D	101	7
ND	86	7	ND	139	2	ND	121	1	ND	101	10
ND	92	3	ND	89	10	ND	110	7	D	121	6
ND	112	10	ND	118	8	ND	119	5	ND	119	2
ND	116	9	ND	102	4	ND	98	3	ND	114	2
ND	115	4	D	107	5	ND	108	4	ND	118	2
ND	99	11	ND	134	5	ND	109	9	ND	103	6
ND	117	11	ND	106	0	ND	110	10	ND	107	3
D	22	17	ND	93	5	ND	120	10	-	-	-
ND	99	3	D	129	4	ND	127	4	-	-	-
D	81	6	ND	115	1	ND	127	6	-	-	-

The data is available in machine readable form at

<http://www.uea.ac.uk/~gj/nunion>