ECNS561, Fall 2011

Take-home Graded Practice Opportunity

Due date: September 23, 2010, 5:00 p.m. (to Jane or Rebecca)

1. Evaluate the following sums:

$$a) \quad \sum_{i=1}^{3}\sum_{j=1}^{3} 2$$

$$b) \quad \sum_{i=1}^{5} i \cdot j$$

$$c) \quad \sum_{i=1}^{3} \frac{Y^{-}i}{i}$$

$$d) \quad \sum_{i=1}^{3}\sum_{j=1}^{3} -1^{i} \cdot Y_i \cdot Y_j$$

2. Suppose that you trying to determine the number of different combinations of name initials.

   (a) If all people have two given names (a first and a middle) and one surname, how many total unique combinations are possible?

   (b) If some people have only one given name and surname and other have two given names, how many total unique combinations of initials are possible?

3. Suppose that the following table describes the population of strikeouts, walks, and earned run averages for the starting pitcher rotation of a baseball team.

Strikeouts	**Walks**	**Earned Run Average (ERA)**
80	130	2.5
46	88	3.25
112	90	4.75
75	52	5.5
92	75	3.5

   Calculate the following:

   (a) Expected value of each variable.

(b) Variance of each variable.

(c) Standard deviation of each variable.

(d) Interpret the standard deviations.

4. You are studying youth school violence and its relationship to the number of police officers in a school. You know that the joint probability function is as follows:

		Number of Police Officers						
		0	1	2	3	4	5	6
Youth violence cases	0	0.03324	0.04378	0.02869	0.02324	0.02119	0.00198	0.00206
	1	0.11545	0.07189	0.0499	0.02901	0.01155	0.00144	0.00033
	2	0.11158	0.09628	0.04982	0.01762	0.00659	0.00458	0.00038
	3	0.09386	0.04166	0.01632	0.005	0.00096	0.00061	0.00005
	4	0.04147	0.01699	0.00311	0.0025	0.00022	0	0
	5	0.02732	0.00428	0.00429	0.00066	0.00003	0	0
	6	0.00927	0.00091	0.00056	0.00005	0	0	0

Calculate the following:

(a) Marginal probability function of each individual variable. What do these marginal pdfs imply about the likelihood of observation youth violence and a particular number of police officers?

(b) Expected value of youth violence cases.

(c) Expected value of police officers.

(d) Variances around each expected value.

(e) Correlation between the number of youth violence cases and the number of police officers.

5. Applied practice. Please turn in your code and a summary of your output. If you are going to do the assignment in anything other than SAS, please also email me your code. You don't have to print the entire output window; just provide the relevant statistics asked for in the problems.

You are presented with two probability density functions, one that characterizes the likelihood of a person being of a particular political view and another characterizing the likelihood of a person owning a particular number of pets. Numbers in parentheses are used to represent each of the discrete outcomes.

Party	**P[Party = party]**
Very Liberal (1)	0.2
Moderate (2)	0.7
Very Conservative (3)	0.1

# of Pets	**P[# Pets = # pets]**
0	0.4
1	0.3
2	0.2
3	0.1

Perform the following in IML (or another matrix language):

(a) Create a dataset with 60 observations of each variable, such that the observations are generated using the pdfs above.

(b) Again in IML, create a joint probability density table using each of the marginals.

(c) Calculate the expected value and variance of each variable. Don't use any of the packaged procedures – they assume equally likely outcomes, which is not the case in this problem.

(d) Create a frequency table of the created data set to check whether the data follow the appropriate pdf. In SAS, you can do this using the `proc freq` procedure (see your SAS lab notes on the use of the `proc freq` procedure). To output your matrices into a SAS dataset, use the following SAS code:

```
/* Substitute the output SAS dataset name for ‘‘SASdata’’ and
   the IML matrix name for ‘‘IMLdata’’ */

varnames = {‘‘Party’’ ‘‘Pets’’};
create SASdata from IMLdata[c=varnames];
append from IMLdata;
quit;
```