Statistics **NYU – Spring 2001**
Prof. Giorgio Topa **V31.0018-001**

PROBLEM SET 10
Due Friday, April 20

Question 1

Problem 9.24 in Chapter 9 McClave, Benson and Sincich.

Question 2

Problem 9.31 in Chapter 9 McClave, Benson and Sincich.

Question 3

Problem 9.32 in Chapter 9 McClave, Benson and Sincich.

Question 4

Using the joint probability distribution for X = schooling and Y = earnings discussed in class, compute the conditional probability distribution of X given Y = $25,000. Repeat the same computation for X given Y = $100,000. Please comment on any differences between the two.

Question 5

Let X be a random variable defined as the average number of packs of cigarettes smoked per day in one's lifetime. Let Y be another random variable defined as the age at death. The joint probability distribution of (X,Y) is reported in the following table:

	X	**0**	**1**	**2**	**3**	
Y						
60		14	12	5	4	**35**
70		30	10	4	1	**45**
80		16	3	1	0	**20**
		60	**25**	**10**	**5**	

(a) Compute the conditional probability distribution of Y given X = 0. Repeat the calculation for Y given X = 1, 2, and 3. Please comment on the differences (if any) among these four different conditional distributions.
(b) Compute the unconditional mean of X, E(X), and of Y, E(Y).
(c) Compute the conditional mean of Y given each of the possible values for X: E(Y|X = 0), E(Y|X = 1), E(Y|X = 2), E(Y|X = 3). How do they differ from the unconditional mean (if at all)? Please comment.
(d) On a graph with X on the x-axis and Y on the y-axis, plot the Conditional Expectation Function E(Y|X). Is it a straight line? Is it increasing or decreasing in X? What does it tell us about the relationship between smoking and age at death?
(e) What is the definition of independence?
(f) Now suppose X and Y were independent random variables. What would the relationship be between the conditional probability distributions of Y given specific values of X and the marginal (unconditional) distribution of Y? What would the relationship be between the conditional probability distributions of X given specific values of Y and the marginal (unconditional) distribution of X?
(g) Keeping the same marginal distributions for X and Y as in the above table, draw a new table for the joint probability distribution p(x,y) for the case in which X and Y are independent.