

**ECONOMICS 6331 – Probability and Statistics, Fall 2005**

Homework 6. Wednesday October 26. Due Monday October 31.

1. (32% of Midterm 2, Fall 2003) Consider two random variables  $X$  and  $Y$ . Assume they both are discrete and that both  $X$  and  $Y$  can take the values 1,2, and 3. The probabilities for  $(X,Y)$  are shown in the following table:

	X=1	X=2	X=3
Y=1	2/24	3/24	7/24
Y=2	1/24	3/24	2/24
Y=3	1/24	2/24	3/24

- i) Find the marginal probabilities of  $X$  and  $Y$ . Mark clearly which are the marginal probabilities of  $X$  and which are the marginal probabilities of  $Y$ . Explain what the marginal probabilities measure.
- ii) Find the mean and the variance of  $Y$ .
- iii) Are the events  $X = 1$  and  $Y = 1$  independent events?
- iv) Are the random variables  $X$  and  $Y$  independent?
- v) Find the probability  $P(\{X > 2\} \cap \{Y \leq 2\})$
- vi) Find the conditional distribution of  $X$  given  $Y = 2$ .
- vii) Find the random variable  $E(X|Y)$ .
- viii) Find  $Var(X|Y = 2)$ .

2. Ramanathan, Exercise 5.1, page 117.