ECO 3150 C

Assignment 2

K. Day Winter 2019

---

1. The accompanying table shows the proportions of computer salespeople classified according to marital status and how long they remained in their jobs:

	Time on job	
Marital Status	$\geq$ one year	$<$ one year
Married	0.64	0.13
Single	0.17	0.06

   (a) What is the probability that a randomly chosen salesperson was married?

   (b) What is the probability that a randomly chosen salesperson left the job within a year?

   (c) What is the probability that a randomly chosen single salesperson left the job within a year?

   (d) What is the probability that a randomly chosen salesperson who stayed in the job for at least a year was married?

   (e) Are marital status and length of time that the salesperson remained in the job independent? Explain your answer.

2. A store owner stocks an out-of-town newspaper that is sometimes requested by a small number of customers. Each copy of this newspaper costs her 70 cents, and she sells them for 90 cents each. Any copies left over at the end of the day have no value and are destroyed. Any requests for copies that cannot be met because stocks have been exhausted are considered by the store owner to be a loss of 5 cents in goodwill. The probability distribution of the number of request for the newspaper in a day is shown in the accompanying table. If the store owner defines total daily profit as total revenue from newspaper sales, less total cost of newspapers ordered, less goodwill loss from unsatisfied demand, what is the expected profit if four newspapers are ordered?

Number of requests	0	1	2	3	4	5
Probability	0.12	0.16	0.18	0.32	0.14	0.08

3. A researcher suspected that the number of between-meal snacks eaten by students on a day during the final exam period might depend on the number of exams a student had to write on that day. The accompanying table of joint probabilities was derived from the results of a survey of students:

Number of	Number of Tests (X)			
Snacks (Y)	0	1	2	3
0	0.07	0.09	0.06	0.01
1	0.07	0.06	0.07	0.01
2	0.06	0.07	0.14	0.03
3	0.02	0.04	0.16	0.04

   (a) Find the marginal probability distribution of X and compute the expected value of the number of exams written during a day.

   (b) Find the marginal probability distribution of Y and compute the expected value of the number of snacks eaten during a day.

   (c) Find and interpret the conditional probability distribution of Y, given $X = 3$.

   (d) Find the covariance between X and Y.

   (e) Are the number of snacks eaten and the number of exams written statistically independent?

4. Prove that the following mathematical statement is true:

$$\text{var}(cX) = c^2E(X^2) - c^2[E(X)]^2 = c^2\text{var}(X) \ ,$$

   where X is a random variable and c is a constant.

This assignment is due at the beginning of class on Tuesday, February 26th, 2019. In answering the questions, please include all formulas used and show your work.