The Pennsylvania State University

Department of Economics

Econ 390, Section 101, Summer 2007

Homework Assignment # 3

Due: Monday, June 11, AT THE BEGINNING OF CLASS

Problem 1

Insurance company has 1500 clients - truck drivers. Each client is insured against a car accident. Probability that an accident happens while a client is insured is 0.10. Find the probability that $100 - 200$ drivers will be involved in accidents.

Hint: Think about approximation to the binomial distribution.

Problem 2

"Drinkers Inc" purchases an expensive refrigerator. Producer claims that refrigerators of this type work for 5 years on average.

Assume that probability that the unit dies in t years has an exponential distribution. Find the probability that refrigerator will die in $6 - 8$ years.

Hint: Use information on the average to recover parameters of the distribution.

Problem 3

Kate has collected data on gas prices in two cities. One is located in California and the other is in Pennsylvania. Gas prices depend on a great number of events and could be treated as random. Denote prices in CA as X and prices in PA as Y. The collected data has been recorded in the form of Joint Probability distribution

		Price in PA (Y)			
		2.90	2.95	3.00	3.05
	2.90	0.05	0.03	0.01	0.00
Price in	2.95	0.18	0.09	0.03	0.01
CA (X)	3.00	0.03	0.19	0.09	0.01
	3.05	0.01	0.05	0.18	0.04

a) Write down the marginal probability function $P(X)$ of X

b) Write down the marginal probability function $P(Y)$ of Y

c) Find the mean of X and the mean of Y (Hint: Use your marginal probability functions)

d) Find the conditional probability function of Y for $X = 3.00$.

e) Use your answer for d) to calculate conditional expectation of Y, when $X = 3.00$.

(**Hint**: You have to find $E(Y|X = 3.00)$)

f) Find correlation between X and Y

Problem 4

Suppose that you toss a pair of dice and write down the values of the faces from each die.

a. What is the population distribution for one die?

b. Determine the sampling distribution of the sample means obtained by tossing two dice.

(**Hint:** to answer question b think of all combinations that could lead to 2 points, 3 points and etc.)

Problem 5 (Only if we have time to cover CLT in class)

Given a population with mean $\mu = 100$ and variance $\sigma^2 = 81$, the central limit theorem applies when the sample size $n \geqslant 25$. A random sample of size $n = 25$ is obtained.

a. What are the mean and variance of the sampling distribution for the sample means?

b. What is the probability that $\bar{x} > 102$

c. What is the probability that $98 \leq x \leq 101$