HOMEWORK 4

Show ALL WORK to get full credit.
(Write the pledge on top of your work and sign under it.)

Note: In all problems, round probabilities to four decimal places (unless otherwise stated).

Problem 1:

Three boxes labeled as A, B, and C, are present. Details of the boxes are:

- Box A contains 2 red and 3 black balls
- Box B contains 3 red and 1 black ball
- Box C contains 1 red ball and 4 black balls

All the three boxes are identical having an equal probability to be picked up. Assume a red ball was picked up, what is the probability that it was from box A? (*Hint:* Use the Bayes' Theorem.)

Problem 2:

The following table gives data on the distribution of the number of vehicles in American households.

Number of vehicles	0	1	2	3	4
Proportion	0.10	0.34	0.39	0.13	0.04

a) Find the expected value of this probability model and interpret.
b) Find the value of $P(X \geq 2)$.
c) Find the value of $P(X \leq 1)$.
d) Find the value of $P(X \geq 1)$.
e) Find the value of $P(X \geq 4)$.

Problem 3:

In a Straight Pick 3 lottery you choose a 3-digit number. A 3-digit number is chosen at random. If your number matches, you win $250.

a) How many different 3-digit numbers are there?
b) What is the probability that your 3-digit number is the winning number?
c) There are two outcomes in the sample space: {$250, $0}. Using these, write down a probability model for the Straight Pick 3 lottery.
d) What is the expected value of this probability model?
e) What does this tell you about the game? That is, does it favor the player or the lottery?
f) What if the game costs $0.50 to play? What happens to the expected value?

Problem 4:

An insurance company offers Mississippi adults between the ages of 25 and 34 a $100,000 life insurance policy for $18 a month. They use the fact that Mississippi has a yearly death rate of 172.8 per 100,000 residents aged 25-34 years.
   a) Find the expected value per customer for the insurance company at the end of one year for the policy described.
   b) If the insurance company has 10,000 customers with these life insurance policies in Mississippi, what is its profit at the end of the year?

Problem 5:

A department store is running a promotion one Saturday by giving out coupons for $10 of free merchandise. Based on data collected in the past, only one-fourth of customers who shop on that Saturday use the coupon but do not purchase any other merchandise. However, one-third of customers purchase $40 in merchandise and then use the coupon. Another one-third of customers use the coupon after ringing up a total of $75 in merchandise. The remainder of customers who come in the store do not take advantage of the promotion at all.
   a) Find the expected value of the promotion per customer for the department store.
   b) If the store has 720 customers on the promotional Saturday, what is its expected revenue for the day?