1. (30%) If a random variable has the Poisson distribution with average number of successes $\lambda = 4$:

   (a) (20%) Calculate the probability for the values 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12 and then the expected number of successes and the variance of this distribution. (Note: it is easier to calculate the probability values using the recursive formula)

   (b) (10%) Give the relationships between mean λ, expected number of successes μ, and variance σ^2, based on the results obtained in (a).

2. (10%) A traffic engineer wants to estimate the population mean within ± 1 mile per hour with 99 percent confidence, and based on previous speed studies the standard deviation is expected to be 4 miles per hour. What is the minimum sample size required? (Normal distribution with 99 percent confidence: $z=2.575$)

3. (30%) Consider the following data on the number of bedrooms, the number of baths, and the price of one-family homes recently sold in a community:

Number of Bedrooms x_1	Number of Baths x_2	Price (Dollars) y
3	2	23,800
2	1	19,300
4	3	28,800
2	1	19,200
3	2	24,700
2	2	19,900
5	3	33,400
4	2	27,900

Obtain a linear equation for the price of one-family home in terms of the number of bedrooms and baths.

4. (30%) Suppose we want to compare the average yield of four varieties of wheat on the basis of the following data (in pounds per plot) which an agronomist obtained for three test plots of each variety:

   Variety A: 51, 52, 47
   Variety B: 50, 43, 42
   Variety C: 46, 46, 43
   Variety D: 49, 49, 46

Test the null hypothesis against the alternative that the treatment means are not all equal (or that the treatment effects are not all zero).
Note: $F_{.05} = 4.07$ for $k-1=3$ and $k(n-1)=8$.