Instructions

1. Please be at your best handwriting or type.
2. Please write on one side of the paper only.
3. Please write the solutions in the order of the problems.
4. The problems are graded out of 2 points each: 2=correct, 1=not correct, but something correct done, 0=otherwise.

Problems

1. Suppose that only 25% of all drivers come to a complete stop at an intersection having flashing red lights in all directions when no other cars are visible. What is the probability that, of 20 randomly chosen drivers coming to an intersection under these conditions,
   a. At most 6 will come to a complete stop?
   b. Exactly 6 will come to a complete stop?
   d. How many of the next 20 drivers do you expect to come to a complete stop?

HINT: Set X=# of drivers who come to a complete stop out of 20. Then X has a binomial distribution.

2. The results of an entry test for a data processing company have a normal distribution with mean 60 and standard deviation 10. Only the top 2 percent of applicants who took the test will be hired.
   a. What is the lowest score of a hired applicant?
   b. What percentage of applicants scored between 50 and 65?

4. Let $X$ = hourly median power (in decibels) of received radio signals transmitted between two cities. It is believed that the lognormal distribution provides a reasonable probability model for $X$. If the parameter values are $\mu = 3.5$ and $\sigma = 1.2$, calculate the following:
   a. The mean value of received power
   b. The probability that received power is between 50 and 250 dB

5. Extensive experience with fans of a certain type used in diesel engines has suggested that the exponential distribution provides a good model for time until failure. Suppose the mean time until failure is 25,000 hours. What is the probability that
   a. A randomly selected fan will last between 20,000 and 30,000 hours?
   b. Lifetime of a fan exceeds the mean value by more than 2 standard deviations?

652 students only

6. A farmer divided his field into a large number of small plots of the same size. The amount of yield per plot has a mean of 100 bushels with a standard deviation of 8 bushels. If 64 plots are selected at random, find the probability that the mean yield will be between 98 and 102 bushels