Probability lesson plan 5

Normal Distribution

1. X is normally distributed and the mean X is 12 S.D. is 4.
   a. Find out the probability of the following
      (i) $X \geq 20$, (ii) $X \leq 20$ and (iii) $0 \leq X \leq 12$
   b. Find x' when $P(X > x') = 0.24$
   c. Find x_0' and x_1' when $P(x_0' < X < x_1') = 0.50$ and $P(X > x_1') = 0.25$

2. The mean yield for one-acre plot is 662 kilos with a s.d. 32 kilos. Assuming normal distribution, how many one acre plots in a batch of 1,000 plots would you expect to have yield
   (i)   Over 700 kilos
   (ii) Below 650 kilos
   (iii) What is the lowest yield of the best 100 plots?

3. The local authorities in a certain city install 10,000 electric lamps in the streets of the city. If these lamps have an average life of 1000 burning hours with a standard deviation 200 hours. What number of lamps might be expected to fail
   (i)   In the first 800 burning hours?
   (ii) Between 800 and 1200 burning hours?
   After what period of burning hours would you expect that
      (a) 10% of the lamps would fail?
      (b) 10% of the lamps would be still burning?

4. A sample of 100 items is taken from a batch known to contain 40% defectives. What is the probability that the sample contains:
   (i)   At least 44 defectives.
   (ii) Exactly 44 defectives.

5. In an examination it is laid down that a student passes if he secures 30% or more marks. He is placed in the first, second or third division according as he secures 60% or more marks, between 45% and 60% marks and marks between 30% and 45% respectively. He gets distinction in case he secures 80% or more marks. It is noticed from the results that 10% of the students failed in the examination; where as 5% of them obtained distinction. Calculate the percentage of students placed in the second division. (assume normal distribution of marks)