TD604, Tutorial 4

1. For a standard normal distribution, for various k's, compute the fraction of the population with attribute x between $\mu + k\sigma < x < \mu + (k+1)\sigma$.

2. A company has the following hiring policy. It conducts an aptitude test and computes the mean μ and the standard deviation σ. It then pays the following salaries:

Score x	Salary
$x < \mu - \sigma$	Not Hired
$\mu - \sigma \leq x < \mu$	Rs. 1 lakhs
$\mu \leq x < \mu + \sigma$	Rs. 2 lakhs
$\mu + \sigma \leq x < \mu + 2\sigma$	Rs. 4 lakhs
$\mu + 2\sigma \leq x$	Rs. 8 lakhs

   Assuming that those not hired get Rs. 0 as salary, what is the mean salary and what is the variance? What is the Gini coefficient?

3. Two different sets of lamps were tested for life beyong 1 year. Out of 22 lamps of Brand A, 8 worked beyond 1 year, while for Brand B, out of 11, only 7 worked beyond 1 year. With what confidence can you say that Brand B is better than brand A?

4. A nutritional cereal is supposed to improve the weight of 1-year-olds. The national average for this was 7.2 kilos with a SD of 0.9. After the therapy, a sample of 34 children had average weight 7.9. With what confidence can you say that the cereal worked. If you were to estimate a 90% confidence interval for the average weight of children with the therapy, what would your interval be? Assume that the variance did not change with the therapy.

5. The probability that a lamp fails in a particluar month is p. The probability that it fails in a subsequent month is unchanged at p. We have the following data for 1000 lamps.

Month	1	2	3	4	5	6	>6
Fails	63	54	45	23	32	11	remaining

   Devise a method of estimating p.

6. Pick a taluka of your district and compute the mean village literacy fraction μ and the standard deviation σ. Now, pick a random sample of 10 villages and compute their mean α. How close is α to μ? Assuming that $\mu > \alpha$, what was the probability that this mean of 10 villages would have been α or lower. Do this for another taluka.