1. Let X equal the dirt in kg per day produced by a typical family in Dhaka city. Suppose the standard deviation of X is 2 kg. To estimate the mean μ of X, an agency took a random sample of 100 families and found they produced $\frac{1}{2}$ metric ton of dirt every day. Find an approximate 95% confidence interval for μ.

2. Let X equal to the amount of food in pound per day consumed by a labor. Suppose the variance σ^2 of X is 0.25 . To estimate the mean μ of X, an agency took a random sample of 50 labors and found they consumed on average 4 found food per day. Find an approximate 85% confidence interval for μ.

3. In a certain motivational conference, a speaker delivered a speech to 300 people and two-third of them responded after the conference. If 75% responses were positive. Find an approximate 90% confidence interval for the fraction p of the people who motivated by the speaker.

4. In a factory there were 300 workers under flu infection, 75% of the workers were hospitalized. If half of the total workers survived after the treatment, find the confidence interval of the proportion with a 3% significance level. Is the treatment effective? Why?

5. A manufacturer produces a new cooker and they claimed that it will reduce the fuel cost in half with 90% accuracy. Now design decision rule for the process with significance 0.05 by testing the cooker to 50 customers.

6. A company produces mosquito killing bat whose average lifetime is 360. days and average variation 60 days. It is claimed that in a newly developed process the mean lifetime can be increased. Design a decision rule for 100 samples with 0.1 significance. If the new process has increased the mean lifetime to 375 days, assuming a sample of 120 bats with estimated lifetime 370 days, find α and β. Again, a sample of 80 bats is tested and it is found that the average lifetime is 368 days. Find the $p-$value of the test.

7. A company produces electric bulbs whose average life time is 180 days and average variation 10 days. It is claimed that, in a newly developed process the mean life time can be increased.
   (a) Design a decision rule for the process at the 0.05 significance to test 100 bulbs.
   (b) What about the decision if the average life time of a bulb (i) 184 days (ii) 187 days?
   (c) If the new process has increased the mean life time to 185 days. Find α and β for the estimated mean 183 days for 80 samples.
   (d) If the estimated average life time for 55 samples is 184 days, find the $p-$value of the claim of the manufacturer.

8. Design a decision rule to test the hypothesis that a die is fair if we take a sample of 150 trials of the die to get even/odd faces and use 0.01 as the significance level. Predict the acceptance and critical region.

9. Design a decision rule to test the hypothesis that a coin is fair if we take a sample of 120 trials of the die to get head/tail and use 0.1 as the significance level. Predict the acceptance and critical region.

10. A company produces an electric tool whose average life time is 260 days and variance 169 days. It is claimed that, in a newly developed process the mean life time can be increased. If the new process has increased the mean life time to 276 days, assuming a sample of 80 bulbs with estimated life time 269 days, find α and β.

11. A pharmaceutical company produces a new medicine and they claimed that it will reduce the migraine pain very fast with 85% accuracy. Design a decision rule for the process with the significance 0.01 by apply the medicine to 150 people.

12. Design a decision rule to test the hypothesis that a coin is fair if we take a sample of 250 trials of the die to test the coin as fair and use 0.99 as the confidence level. Predict the acceptance and critical region.