1.   If $X \sim N(200, 80)$ and a random sample of size 5 is taken from the distribution, find the probability that the sample mean
    a)   is greater than 207,   b)   lies between 201 and 209.
            0.0401   0.3891

2.   A normal distribution has a mean of 30 and a variance of 5. Find the probability that
    a)   the average of 10 observations exceeds 30.5,   0.2389
    b)   the average of 40 observations exceeds 30.5.   0.0793

3.   A random sample of size 100 is taken from $B(20, 0.6)$. Find the probability that the
    a)   sample mean is greater than 12.4   b)   sample mean is less than 12.2
                    0.0336   0.8186

4.   The heights of a new variety of sunflowers are normally distributed with mean 2m and standard deviation 40 cm. 100 samples of 50 flowers each are measured. In how many would one expect the sample mean to be
    a)   greater than 210 cm   b)   between 195 cm and 205 cm   c)   less than 188cm
                    4   6   2

5.   A large shipment of cereal boxes is delivered to a supermarket. The manager is told that the weights of the cereal boxes are normally distributed, with a mean of 16.5 ounces and a standard deviation of 0.5 ounces.
    Find the probability that a random sample of 100 boxes has a mean weight of between 16.49 and 16.51 ounces.   0.1586

6.   A certain type of tennis ball is known to have height of bounce which is normally distributed with standard deviation 2 cm. A sample of 60 tennis balls is tested and the mean height of bounce of the sample is 140 cm. Find (a) 95% (b) 98% confidence intervals for the mean height of bounce of this type of tennis ball.
    (139.49, 140.51); (139.40, 140.6)

7.   In 2007, a simple random of 100 sales invoices was taken from a very large population of sales invoices. The average value of sales was found to be $18.5 with a standard deviation of $6.0. Obtain 95% confidence interval for the true average value per sale. How large a simple random sample would have been required so as to be 95% confident that the sample mean did not differ from the true mean by more than $0.5?
                            (17.32, 19.68)

8.   Fifty bags of sugar were randomly selected and carefully weighed. The mean weight was 1.004 kg and the standard deviation 0.0002 kg. Find the 95% interval estimate for the mean weight of all bags.   (1.003945, 1.00405)

9.   A psychologist has developed a new test of spatial perception, and she wants to estimate the mean score achieved by male pilots. How many people must she test if she wants the sample mean to be in error by no more than 2.0 points, with 95% confidence? An earlier study suggests that $\sigma = 21.2$.   432

10.   In measuring reaction time, it is estimated that the standard deviation is 0.5 seconds. How many observations must be taken in order to be 99% confident that the error in the estimate of mean reaction time will not exceed 0.1 seconds.   166

11.   In a market research survey 25 people out of a random sample of 100 from a certain area said that they used a particular brand of soap. Find 97% confidence interval for the proportion of people in the area who use this brand of soap.   (0.1560, 0.3440)

12.   In a sample of 400 shops taken in year 2006, it was discovered that 136 of them sold carpets at below the list prices which had been recommended by manufacturers.
    a)   Estimate the percentage of all carpet selling shops selling below list price.   34%
    b)   Constuct the 95% confidence interval for this estimate.
            (29.4%, 38.6%)
    c)   What size sample would have to be taken in order to estimate the percentage to within $\pm 2\%$?   2155.14

13.   A random sample of transactions in a set of accounts is taken for investigation by a firm of auditors. Out of the sample of 5,000 entries, 100 reveal some errors of entry or of procedure. Estimate the proportion of error in the whole population of transaction using 95% confidence limits.   (0.01612, 0.0238808)

14.   In a random sample of 300 employees, 55% were found to be in favour of strike action. Find the 90% confidence interval for the proportion of all employees in the company who are in favour of such action.   (0.503, 0.593)

15.   a)   In a random sample of 1000 houses in a certain city, it is found that 628 own colour television sets. Find the 98% confidence interval for the fraction of homes in this city that have colour sets.   (0.592, 0.664)

    b)   How large a sample is needed in (a) if we wish to be 98% confident that our sample proportion will be within 0.05 of the true proportion of houses in the city that have colour television sets?   506

16.   A random sample of 40 drums of a chemical, drawn at random from among 200 such drums whose weights can be assumed to have the standard deviation $\sigma = 10.2$ pounds, has a mean weight of 240.80 pounds. Construct a 95% confidence interval for the mean weight of the 200 drums.   (237.97, 243.63)