1 TUTORIALS

TUTORIAL 1

1. Of those taking a particular statistics course, 20% ar accounting students 30% are economics students and 50% are business students. 70% of account students pass at first sitting, 60% of the economics students pass at first sitting and 20% of the business students pass at the first sitting.

   (a) What is the overall percentage of students who are successful at the first sitting?

   (b) If a randomly selected student turns out to have passed at the first sitting, what is the probability that she is an accounting student?

2. 40% of all sales calls are successful. Five calls are made on a particular day and the number of successes X is observed. Write down the pdf and cdf of X. Hence find the probability of obtaining

   (a) exactly three successes;

   (b) at most 3 successes;

   (c) more than 3 successes.

3. 25% of all persons in a large population are known to favour the Honest Democratic Party. If 10 people are drawn from this population at random determine the probabilities that

   (a) None favour the HDP;

   (b) All 5 favour the HDP;

   (c) Between 2 and 4 favour the HDP;

   (d) At most 3 favour the HDP.

TUTORIAL 2

1. The sales per day for a product is estimated as follows based on past records.

Daily Demand (X)	Probability
10	.1
11	.2
12	.4
13	.3

   (a) Obtain the mean and variance of the daily sales.

   (b) If the profit can be describes by the equation

$$Profit = -10 + 4 \cdot X,$$

   what is the expected daily profit? What is the variance of the daily profit?

2. 42 balls are numbered 1 to 42. You personally decide that six are successes —your lotto card. If six balls are selected at random, what is the probability of (a) match 3? (b) match 4? (c) match 6?

3. A sample of 5 accounts is chosen without replacement from a set of 20. From past experience it is known that 20 per cent of the accounts are in error. What is the probability that not more than two errors will occur in the sample.

4. In a large accounting firm, a sample of 20 accounts from a very large set of $2,000$ items are subject to examination. From previous experience, it is known that 10% of all accounts are in error.

   (a) State the number of errors expected in the sample. What is the variance?

   (b) If not more than two errors are found in the sample, the financial statements are accepted. What is the probability that this will happen?

   (c) Calculate the probability that between 2 and 4 errors will be found in the sample.

5. Alpha Ltd has three different marketing strategies open to it as a means of increasing profitably. Omega Ltd is a major competitor which may pursue any one of the same strategies thus affecting the profitability of Alpha's choice of strategy.

   The following table shows the estimated annual profits in £of Alpha for each of Omega's choice over the next 5 years.

	Omega's Choice		
Alpha's Choice	1	2	3
1	20	22	21
2	25	24	27
3	28	27	25

   Decide which strategy Alpha Ltd should choose:

   (a) when it is certain that Omega Ltd will choose strategy 3;

   (b) when the probabilities of Omega Ltd choosing strategies are assessed as follows:

Omega's Strategy	1	2	3
Probability	.25	.45	.3

TUTORIAL 3

1. The error rate in an accounting population thought to be .05. Find the probability that more than 5 errors will occur in a sample of size 100 line items selected for auditing.

2. A secretary makes 2 errors per page on the average. What is the probability that he makes

   (a) 4 or more errors in the next page he types?

   (b) no errors in the next page he types?

3. A soft drinks machine is regulated so that it discharges an average of 7 ounces per cup. The amount of drink is normally distributed with standard deviation equal to 0.5 ounce.

   (a) What fraction of cups will contain more than 8.0 ounces?

   (b) What is the probability that a cup contains between 6.5 and 7.5 ounces?

   (c) How many cups are likely to overflow if 8.2 ounce cups are used for the next 1000 drinks?

   (d) Below what value do we get the smallest 10% of the drinks?

TUTORIAL 4

1. The amount of drink dispenses from a soft drinks machine is normally distributed with standard deviation equal to 0.5 ounce.

   (a) Find a 95% confidence interval for the mean of all drinks dispensed by this machine if a random sample of 9 drinks has an average content of 7.4 ounces. You may assume that the standard deviation $\sigma = 0.5$.

   (b) How large a sample is needed if we wish to be 95% confident that the sample mean will be within 0.3 ounce of the true mean?

2. A hundred students are randomly selected and asked how far they have to travel to college. It turns out that

   $$\overline{x} = 4.5; \qquad s^2 = 3.2$$

   Determine a 95% confidence interval for the mean distance a student travels to college (for the population of students in the college)

3. A random sample of size 121 taken from a normal distribution has a mean $\overline{x}$ of 12.9 and a standard deviation s of 3.2. Calculate a 99% confidence interval for μ. If $\overline{x}$ and s are the same for a sample of size 9, what would the 99% confidence interval be?

4. A sample of 10 small debts from a small business were

   16.39, 25.09, 16.31, 20.94, 17.58, 19.06, 17.21, 18.48, 16.88, 15.51

   If it can be assumed that the observations are normal, obtain a 95% confidence interval for the average debt of the business. What would the confidence interval be if it were known that the variance of the debts is 9?

5. A political pollster would like to estimate the proportion of first preference votes a particular candidate will obtain in a forthcoming election. The pollster wishes to be 90% confident that the prediction is correct to within 4% of the true proportion. What sample size is needed?

   A sample of this size was taken and it was found that 58% would give

the candidate their first preference votes. Estimate the 90% confidence interval for the true proportion of first preferences the candidate will obtain.

6. An auditor for a consumer agency would like to determine the proportion of claims that are paid by a health insurance company within two months of receipt of claim. A random sample of 200 claims were selected and it was found that 160 were paid within two months. Obtain a 99% confidence interval for the true proportion paid within two months.

7. The personnel director of a large corporation wishes to study absenteeism. A random sample of 30 workers yielded $\overline{x} = 9.7$ days and $s = 4.0$ days. Fifteen employees were absent more than 10 days. Obtain a 95% confidence intervals for:

   (a) The true average number of days absent;

   (b) The proportion of all workers absent more than 10 days.