Confidence Intervals

Question 1

(a) An IT competency test, used for staff recruitment, is devised so as to give a normal distribution of scores with a mean of 100. A random sample of 49 experienced IT users who are given the test achieve a mean score of 121 with a standard deviation of 14. Compute a 95% confidence interval for the group.

(b) A random sample of 64 data scientists was selected and it was found that their average income was \$50,000 with a standard deviation of \$3,200. Compute a 95% confidence interval for the mean salary.

(c) A manufacturer of computer monitors has, for many years, used a process giving a mean working life of 4700 hours for components. A new process is tried to see if it will increase the life significantly. A sample of 100 monitors gave a mean life of 5000 hours, with a standard deviation of 1400 hours. Compute a 95% confidence interval for the mean life of components built using the new process.

Question 2

A well-known polling company estimates that 57% of Irish voters support a new constitutional amendment. 800 people were randomly surveyed and asked about their voting preferences. 488 of the 800 people responded positively to the amendment. You are required to:

(a) Obtain a point estimate of the proportion of people supporting the constitutional amendment.

(b) Construct a 95% confidence interval for the proportion of people in favour of the constitutional amendment.

Question 3

An insurance company wants to estimate the percentage of drivers who talk on their mobile phones while driving. A random sample of 850 drivers results in 544 who talk on their mobile phones while driving.

(a) Find the point estimate of the percentage of all drivers who talk on their cell phones while driving.

(b) Find a 95% interval estimate of the percentage of all drivers who talk on their cell phones while driving.

Question 4

The conventional treatment for a disease has been shown to be effective in 60% of all cases. A new drug is being promoted by a pharmaceutical company; the Department of Health wishes to test whether the new treatment is more effective than the conventional treatment. A simple random sample of $n = 400$ patients suffering from the disease were given the new drug; the treatment was effective for 320 of them.

(a) Find the point estimate of the percentage of all patients who would find the drug to be effective.

(b) Find a 95% interval estimate of the percentage of all patients who would find the drug to be effective.

(c) What decision would you reach about the new drug? Give reasons for your decision.

Question 5

An insurance company wants to estimate the percentage of drivers who talk on their mobile phones while driving. A random sample of 850 drivers results in 544 who talk on their mobile phones while driving.

(a) Find the point estimate of the percentage of all drivers who talk on their cell phones while driving.

(b) Find a 95% interval estimate of the percentage of all drivers who talk on their cell phones while driving.

Question 6

A manufacturer of computer monitors has, for many years, used a process giving a mean working life of 4700 hours for components. A new process is tried to see if it will increase the life significantly. A sample of 100 monitors gave a mean life of 5000 hours, with a standard deviation of 1400 hours.

Compute a 95% confidence interval for the mean life of components built using the new process.

Question 7

A research company is comparing computers from two different companies, X-Cel and Yellow, on the basis of energy consumption per hour. Given the following data, compute a 95% confidence interval for the difference in energy consumption.

Type	sample size	mean	variance
X-cel	17	5.353	2.743
Yellow	17	3.882	2.985

Remark: It is reasonable to believe that the variances of both groups is the same. Be mindful of this.