Question 1

A market researcher wishes to know the market share for Android devices. From a sample of 500 individuals, it was found that 359 use an Android device.

(a) What type of data has been collected here? **(b)** What is the parameter and its value? **(c)** What is the statistic and its value? **(d)** Calculate a 95% confidence interval and interpret this interval. **(e)** How large a sample is required to reduce the *margin of error* in the previous confidence interval to ± 0.02?

Question 2

Google want to estimate the average amount (in dollars) that an individual spends after clicking on a particular Google Ad. In order to achieve this, 1000 people are randomly selected and the amount they spend is recorded. It is found that the average spend is \$42.38 and the standard deviation is \$16.80.

(a) What is the data type? **(b)** Write down the values of: p, $\hat{p}$, μ, $\bar{x}$, σ and s. **(c)** Calculate a 99% confidence interval for the average spend. **(d)** What value of n is needed to estimate the true average spend within $\pm$ \$0.50 with 99% confidence? (i.e., $z_{0.005}\frac{s}{\sqrt{n}} = 0.5$)

Question 3

A manufacturer of aircraft parts wishes to estimate the operating life of a particular component. Thus, a sample of 45 components are used until failure. It is found that the average life is 671.23 hours and the variance is 400 hours-squared.

(a) What type of data was collected?

(b) What is the parameter and its value?

(c) What is the statistic and its value?

(d) Calculate / interpret the 99.9% confidence interval.

Question 4

The government are investigating the difference in proportions of people in rural and urban areas in support of a new policy. Researchers collected data on 154 individuals; of these, 38 lived in rural areas and 116 lived in urban areas. It was found that 52.63% of those in rural areas and 60.34% of those in urban areas support the policy.

(a) What is the true difference in proportions? **(b)** Calculate a 90% confidence for this difference and comment on this interval. **(c)** In the sample of 154 individuals, how many of them support the policy? (i.e., 52.63% of 38 plus 60.34% of 116) **(d)** Based on the answer to part (c), estimate the overall proportion of individuals in support of the policy and construct a 90% confidence interval for the true proportion.

Question 5

Consider the following two types of heat sink used for the purposes of CPU cooling:

	Type 1	Type 2
number tested	50	50
mean CPU temperature	40.1	34.8
standard deviation	2.5	1.1

(a) Identify the parameter of interest. **(b)** Calculate a 95% confidence interval for the parameter and comment. **(c)** How large a sample is required to reduce the *margin of error* in the previous confidence interval to ± 0.4? (note: assume that $n_1 = n_2$)

Question 6

A group of 8 computer science students were randomly selected and asked how many hours they spent gaming last week. The average time was found to be 6.4 hours and the standard deviation was 2.2 hours.

(a) Calculate a 95% confidence interval for μ.

(b) Calculate a 99% confidence interval for μ.

Question 7

Guinness set their bottle-filling machine to put 33cl into each bottle. A sample of 5 bottles were selected at random and measured. The volumes in cl were as follows:

34.1	33.5	32.8	33.1	32.5

(a) Calculate the sample mean and standard deviation. **(b)** Calculate a 95% confidence interval. **(c)** Based on the confidence interval, does it appear that the machine is working correctly?