# Baldivis Secondary College 2019

# Year 12 Mathematics Methods

# Test 6

# Sampling and Confidence Intervals

Name:

### Score: out of

**18**

**Non-Calculator Section (No calculator nor notes, formula sheet is provided)**

**Time: 20 minutes Marks: 18 marks**

1. [3 marks]

Ornithologists erected a bird net in an area of a forest catching 240 birds. They tagged these birds and then released them. A couple of months later they erected their net in another area and caught 180 birds. Of these 30 were tagged. What would be a good prediction of the total number of birds in the forest?

1. [4 marks]

In a school of 600 students, the following table shows the methods students get to school.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Method | Bus | Car | Walk | Other |  |
| Frequency | 302 | 200 | 66 | 32 | 600 |

A stratified random sample of 30 students is to be chosen so each group is represented in their correct proportion.

Determine how many of each group should be chosen for the sample.

1. [1,1 = 2 marks]

The Mathsville Shire Council wishes to determine the opinion of its ratepayers on the new plans for the Euler St development. Identify possible sources of bias inherent in these surveys.

1. The Council sets up a table in Euler St and stops every 8th person who passes by and gets them to complete the opinion survey.
2. The Council selects 100 of their ratepayers randomly from their list and mails out the survey with a reply paid envelope for the return.
3. [2,2 = 4 marks]

A uniform probability distribution for waiting times at a bus stop has a mean of 30 minutes and a standard deviation of 6 minutes. A random sample of how long 36 people wait for the bus is gathered.

1. Define the sampling distribution of the sample means for a sample of 36 people.

1. Explain what permits you to make the assumption of the above distribution.
2. [1,1,3 = 5 marks]

To estimate the proportion of Perth’s population that has been to an AFL match this year a sample of n people were surveyed. A confidence interval based on 2 standard deviations (z = 2), yielded the confidence interval: 0.12 ≤ p ≤ 0.28.

1. State the margin of error.
2. State the sample mean .
3. Show working to demonstrate that there must have been 100 people in the sample.

# Baldivis Secondary College 2017

# Year 12 Mathematics Methods

# Test 6

# Sampling and Confidence Intervals

Name:

### Score: out of

**32**

**Calculator Section (Calculators and 1 page (A4) of notes permitted, formula is sheet provided)**

**Time: 35 minutes Marks: 32 marks**

1. [1,2,2,1 = 6 marks]

In a random sample of 50 people, 18 indicated that they had used public transport in the last year sometime.

1. State the sample proportion.
2. Determine the sample standard deviation.
3. Determine a 95% confidence interval for the population proportion p.
4. Describe what happens to the confidence interval width if we increased our level of confidence to 99%.
5. [3,3,2,2 = 10 marks]

It is known that 60% of Western Australian Public school teachers earn over $80 000.

1. A sample of 300 WA teachers is surveyed about their salary.

Find the probability that more than 0.57 of the teachers in the sample had a salary more than $80 000.

1. Give a range, using the 90% level of confidence.

Use the 90% confidence interval to compare and discuss the following samples.

1. Algebra SHS staff had 27 out of 43 staff with a salary over $80 000.
2. Geometry SHS staff random survey showed 46 out of 94 staff had a salary over $80 000.
3. [4 marks]

It is thought that about 68% of all Year 12 students have their driver’s licence by the time they leave high school. How large a sample would be needed to establish this to within a margin of error of 5% at the 95% confidence level?

1. [2,2,3 = 7 marks]

A random sample of 75 people were asked “Do you prefer AFL to soccer”.

From this the confidence interval 0.763 ≤ x ≤ 0.917 was established at the x% level.

1. How many agreed with the question in the survey?
2. Find the standard deviation of the sample.
3. Determine the confidence level , x%, of the survey.
4. [3,2 = 5 marks]

The WA Health Department has calculated that 18% of Western Australians had a flu shot this year.

1. A new sample of 150 was taken as to who had the flu shot this year and X = number of who had the flu shot was recorded. Give a range using the 95% confidence interval, within you would expect X to be in.
2. If 8 surveys were taken, each of size 150, using the 95% confidence level determine the probability that less than seven of the samples would include the true value of p = 0.18.