GRIFFITH COLLEGE DUBLIN

Assignment Cover Sheet

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Faculty: **Computing Science**

Course: **BSCH** **Stage/year:** **2**

Subject: **Probability and statistics**

Study Mode: Full time **Yes** Part-time _____

Lecturer Name: **Paddhy Fahy**

Assignment Title: **Worksheet 3**

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Additional Information: (ie. number of pieces submitted, size of assignment, A2, A3 etc)

Date due: _____

Date submitted: _____

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Question 1

A survey of 350 randomly selected Irish households shows that only 62% have a broadband connection. Infer a 95% confidence interval for the proportion of all Irish households that have broadband connection.

Answer:

Given,

No of people surveyed (N) = 350
62% People with broadband connection (p) = 0.62
38% People without broadband connection (q) = 0.38

Two steps for finding confidence interval

Step 1: Standard Error

$S_{error} = \sqrt{pq/n}$

$= \sqrt{0.62 * 0.38/350}$
$= \sqrt{0.2356/350}$
0.0259

Hence Standard error = 0.0259

Step 2: Confidence Interval at 95%

= p ± (Standard Error * 1.96)
1.96 in this case as 0.95/2 = 0.4750 i.e. 1.96 from the normal distribution table
= 0.62 ± (0.0259 * 1.96)
= 0.62 ± 0.05076
= 62% ± 5.08%

Question 2

At a vehicle testing centre, 30 out of 200 randomly selected vehicles are found to have defective tyres. Infer a 95% confidence interval for the proportion of all vehicles presenting for testing that have defective tyres.

Answer:

30 out of 200 randomly selected vehicles are found to have defective tyres
i.e. 30/200 * 100
= 15%
So 85% are not to found with defective tyres

N = 200
p = 15% (0.15)
q = 85% (0.85)

Two steps for finding confidence interval
Step 1: Standard Error

$S_{error} = \sqrt{pq/n}$

$= \sqrt{0.15 * 0.85/200}$
$= 0.025$

Hence Standard error = 0.025

Step 2: Confidence Interval at 95%

= p ± (Standard Error * 1.96)
1.96 in this case as 0.95/2 = 0.4750 i.e. 1.96 from the normal distribution table
= 0.15 ± (0.025 * 1.96)
= 0.15 ± 0.049
= 15% ± 4.9%

Question 3

A survey of mortgage holders at the current time shows that 14% are in arrears with their mortgage repayments. Out of the 300 people surveyed, 48% report that they are currently able to manage, while some in the sample also report that although they are not in arrears, they fear for the future. Infer a 99% confidence interval for the proportion of all mortgage holders who are currently in arrears with their mortgage repayments.

Answer:

We need to infer 99% confidence interval for the proportion of all mortgage holders who are currently in arrears with mortgage repayment. According to question 14% are in arrears with mortgage repayments.

14% are in arrears (p) = 0.14
86% are not in arrears currently (q) = 0.86
No of people surveyed (N) = 300

Two steps for finding confidence interval
Step 1: Standard Error

$S_{error} = \sqrt{pq/n}$

$= \sqrt{0.14 * 0.86/300}$
$= 0.020$

Hence Standard error = 0.020

Step 2: Confidence Interval at 99%

= p ± (Standard Error * 2.58)
2.58 in this case as 0.99/2 = 0.495 i.e. 2.58 from the normal distribution table
= 0.14 ± (0.02 * 2.58)
= 0.14 ± 0.516
= 14% ± 5.16%

Question 4

In a low-temperature performance test (CCA test) of 190 vehicle batteries, an average current reading of 160A is observed, with a standard deviation of 14A. Infer a 95% confidence interval for the current output of a battery selected at random.

Answer:

Total no batteries tested (N) = 190
Average Current Reading (Mean) = 160A
Standard Deviation (S) = 14A

Two steps for confidence interval

Step 1: Standard Error
Standard Error = $S/\sqrt{N}$
$= 14/\sqrt{190}$
$= 1.0159A$

Step 2: Confidence Interval @ 95%
= Mean ± (Standard Error * 1.96)
1.96 in this case as 0.95/2 = 0.4750 i.e. 1.96 from the normal distribution table

$= 160 \pm (1.0159 * 1.96)$
$= 160 \pm 1.99$

Question 5

A television programme is watched by 35% of a representative test audience consisting of 350 people. Infer a 95% confidence interval for the proportion of all viewers who watched the programme.

Answer:

Total No of audience (N) = 350
35 % watch the programme (p) = 0.35
65% don't watch the programme (q) = 0.65

Two steps for finding confidence interval
Step 1: Standard Error

$S_{error} = \sqrt{pq/n}$

$= \sqrt{0.35 * 0.65/350}$
$= 0.0254$

Hence Standard error = 0.0254

Step 2: Confidence Interval at 95%

= p ± (Standard Error * 1.96)
1.96 in this case as 0.95/2 = 0.4750 i.e. 1.96 from the normal distribution table
= 0.35 ± (0.0254 *1.96)
= 0.35 ± 0.0499
= 35% ± 5%