12 MATHEMATICS Methods

Investigation 2

Due date: Friday Week 9 by 4pm
Report and Data (Excel) submitted on SEQTA

(Three lessons provided in class)

INTRODUCTION

You are to investigate sample proportions for a set of three related survey questions. The three questions should collectively address different aspects of one chosen research question/topic. The data must be from a Bernoulli distribution (success/fail) and all components of the *Statistical Investigation Process* will be included in your report. You will be required to collect primary data for your pre-trials (details discussed on page 2.)

Example: You may be interested in investigating student and staff perspectives on phone use at school. To investigate this you may survey a sample of year 7-12 students and some teachers with the following three questions:

1) Do you feel phone use in class can disrupt or distract students from their learning? (yes/no)

2) Do you feel phone use in class should be permitted for academic reasons? (yes/no)

3) Do you feel phone use for recreational reasons should be permitted during lunch and recess? (yes/no)

Avoid first person speech: Use *"It is expected that…"* , *"The researcher has…."*, rather than *'I' statements.*

You will apply the *STATISTICAL INVESTIGATION PROCESS, a process that can be described by the following steps:*

1. *Clarify the problem and formulate three questions that can be answered with data that address the problem/topic.*

2. *Design and implement a plan to collect and obtain appropriate data.*

3. *Select and apply appropriate graphical or numerical techniques to analyse the data.*

4. *Interpret the results of this analysis and relate the interpretation to the original question and communicate findings in a systematic and concise manner.*

You will need to design a representative sampling approach to your data collection. However, associations between specific groups and survey responses will not be analysed in this investigation.

Your report should include the following sections:

Report section	Description
0. Cover page	*Name and your report title*
1. Contents page	*Statement of each section and sub-sections along with relevant page numbers*
2. Clarify the problem. Aim, rationale, population and survey questions **(Rationale must be a max of one page).**	*Articulate a clear and precise research question that you seek to answer.* *Provide a short rationale for investigating this problem/topic.* *Describe the population (Population size must be at least 200)* *State the three survey questions that will address your research question/topic.*
3. Design and implement a plan to obtain appropriate data (Methodology):	*You need to think about and discuss:* ➢ *How you will collect and record the data (Sampling techniques)?* ➢ *What level of confidence will you use? What margin of error will you aim for?* ➢ *Provide an estimate for the population proportion for each question and calculate an initial estimate of the required sample size.* ➢ *How will you analyse and summarise the data?* ➢ *Discuss how a representative pre-trial survey can (and will) be formulated to provide a more accurate point estimate for p. (Who will be surveyed?)*
4. Pre-trial sampling	*Survey a representative sample of 30 individuals in order to determine a point estimate for the population mean for each survey question.* *Provide the mean proportion for each question and discuss how these means compare to your estimates in section 3.* *Use this pre-trial sample data, your required level of confidence and target margin of error to re-calculate the required sample sizes for your research questions.*
5 Simulated data and analysis. (Generating the final	*Use a random number generator to produce a data set for each question using the required sample sizes and p values determined in section 4. This data is to be attached in your appendix but analysed*

sample)	*and discussed in this section.* *You must maintain your chosen level of confidence; however, your margin of error may vary from the target M.E you selected initially. Discuss this in this section.*
6. Refine the problem / Further enquiry	*Your research should provide insight into a further point of enquiry. If your results did not match your expectations, you might refine the problem or address why error might be present.*
7. Conclusion	*Provide an appropriate summary of the project*
8. References	*Include any citations*
9. Appendix	*Raw data* *Simulated data* *Other relevant tables etc.*

Note: To perform well in this task you will need to demonstrate high levels of mathematical resoning and reflection. This includes stating assumptions, comparing results with expectations and detailing the methods used in any calculations. This should also all be done with suffecent elaboration throughout the report.

THIS IS TO BE YOUR OWN WORK
You are also expected to collect your own sampled data
Evidence of plagiarism will be addressed in accordance with the school assessment policy.