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As a reference, the requirements for a C- grade and a D-grade have been supplied to provide a benchmark of what is expected in your submitted work.

Geraldton Senior High School

**ATMAM Mathematics Methods**

**Marking Key:** INVESTIGATION 2Random Samples and Sampling Distributions

**50 marks**

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| **Question 1.**  **a) (5 marks)** | | | |
| **Grade** | **Interpret the task and choose the mathematics** | **Apply mathematical knowledge to obtain a solution** |  |
| C | Provides a perfunctory explanation for most lines of code.  Does not explain with and that the sample size increase by 5 with each experiment. | | **3 marks** |
| D | Provides a rudimentary explanation for less than half of the code | | **1-2 marks** |
| **Question 1.**  **b) 5 marks)** | | | |
| **Grade** | **Interpret the task and choose the mathematics** | **Apply mathematical knowledge to obtain a solution** |  |
| C | Provides a perfunctory explanation for each list | | **3 marks** |
| D | Does not provide a satisfactory explanation of the lists | | **1-2 marks** |
| **Question 1.**  **c) (6 marks)** | | | |
| **Grade** |  | **Apply mathematical knowledge to obtain a solution** | **Interpret and communicates results and conclusions** |
| **C** | **3 marks** | Graphs are accurate but lacking labels of scales | Observes the apparent convergence of the Mean to the Population Proportion, but unable to make comparisons between Measured Standard Deviation and |
| **D** | **1-2 marks** | Graphs are incomplete/missing and/or incorrect | Unable to make pertinent observations regards the data or its representations |

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| **Question 2 (6 marks) Question 3 (6 marks)** | | | |
| **Grade** | **Question 2** | **Apply mathematical knowledge to obtain a solution** | **Question 3** |
| **C** | **3 marks** | Constructs accurate graphs that lacking clear scaling including a   * histogram / boxplot for Experiment 50 * simultaneous line graph tracking   + Mean of sample proportions * simultaneous line graph tracking   Measured Standard Deviation | **3 marks** |
| **D** | **1-2 marks** | Graphs lack accuracy / labelling / scaling / and graphs are not complete | **1-2 marks** |
| **Question 4 (8 marks)** | | | |
| **Grade** |  | **Apply mathematical knowledge to obtain a solution** | **Interpret and communicates results and conclusions** |
| C |  | By inspection, observes that **Case 1** measured mean converges more quicky on the population mean than for **Case 2**.  By inspection, observes that **Case 1** measured SD converges more quicky on than **Case 2**.  Compares the S.D.’s for **Case 1** and **Case 2**  Indicates (with some justification) that **Case 1**  If using for the former and for the latter.  **(2 marks)** | Concludes that the data indicates that the measured mean converges on the population mean more quickly for **Case 1** than **Case 2**.  Concludes that the data indicates that the measured S.D. converges to more quickly for **Case 1** than **Case 2**.  Concludes explicitly that and diverge to the advantage of **Case 1**  Concludes **informally** that by the 50th experiment    For the same values of and . **(2 marks)** |
| D |  | Concludes by inspection the measured mean/SD converges more quickly for **Case 1** than **Case 2**.  Informally suggests, without justification, that the Normal Distributions favour the sample proportion  for **Case 1** over **Case 2.**  **(1-2 mark)** | |

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| **Question 5 (14 marks)** | | | |
| **Grade** | **Interpret the task and choose the mathematics** | **Apply mathematical knowledge to obtain a solution** | **Interpret and communicates results and conclusions** |
| **C** | Compares the Sampling Distribution to a Normal Distribution.  From the provided tool selects “Fit to Normal” to make this comparison  From the provided tool, choses just one sample sizes ≥ 20 to fit the Sampling Distribution to a Normal one.  From the provided tool uses Nº of repeats ≥10 000 but ≤100 000  Choses to model and compare the Sampling Distributions from **two** distributions: Normal and Uniform **3 marks** | Runs the simulation tool to obtain **two** sets of simultaneously graphed Sampling Distributions of one sample size ≥20.  Provides sufficient labelling of graphs.  Has used the tool to fit a Normal curve to each Sampling Distribution.  **2 marks** | Compares the Sampling Distribution for each of the parent distributions to the fitted Normal curve.  Explicitly concludes that the Sampling Distribution of the Sample Means is normally distributed and concludes, without justification, that the Sampling Distribution of the Sample Proportions is normally distributed.  **3 marks** |
| **D** | Compares the Sampling Distribution to a Normal Distribution.  From the provided tool, choses just one sample sizes < 20 observe nature of the Sampling Distribution.  From the provided tool uses Nº of repeats ≥10 000 but ≤100 000  Choses to model and compare the Sampling Distributions from **one** distributions. **1-2 marks** | Runs the simulation tool to obtain **one** set of simultaneously graphed Sampling Distributions of one sample size ≤20.  Insufficient labelling of graphs.  Has not used the tool to fit a Normal curve to each Sampling Distribution.  **1 marks** | Judges by eye that the Sampling Distribution is a reasonable fit to the Normal curve.  Explicitly concludes that the Sampling Distribution is normally distributed without awareness of Sample Means and Sample Proportions.  **1-2 marks** |