Probability and Statistical Inference – Digital Portfolio Rubric

Achievement	Excellent	Satisfactory	Basic	Unsatisfactory
% of Marks Available	> 75%	55-75%	40-55%	<40%

<table>
<tr><th colspan="5">Key Characteristics of Achievement Levels</th></tr>
<tr><th></th><th>Excellent</th><th>Satisfactory</th><th>Basic</th><th>Unsatisfactory</th></tr>
<tr>
<td>Prepare</td>
<td>Addresses all required concepts comprehensively demonstrating coherent understanding. Illustrates understanding through application to the dataset provided.
In particular:

Demonstrates correct understanding of all statistical measures.
States (a) research question(s) for which employing a statistical analysis to investigate is suitable.
States hypotheses related to the research question(s) stated which are suitable for testing using statistical tests.
Describes the population and sample in a coherent, concise manner relevant for a statistical analysis to investigate the research question(s) stated.
Identify key issues which may impact interpretation of test findings and drawing any analysis conducted.
</td>
<td>Addresses all required concepts and issues but lacks some detail for some key concepts or issues. Illustrates understanding through application to the dataset provided.
In particular:

Demonstrates correct understanding of all statistical measures.
States (a) research question(s) for which employing a statistical analysis to investigate is suitable.
States hypotheses related to the research question(s) with some minor errors, but which are still suitable for testing using statistical tests.
Describes the population and sample in a coherent manner relevant for a statistical analysis to investigate the research question(s) stated but lacks detail for some aspects.
Identify some issues which may impact interpretation of test findings and drawing any analysis conducted.
</td>
<td>Addresses a core set of key concepts and issues but lacks detail, or this is distributed throughout the portfolio/difficult to locate. Illustrates understanding through application to the dataset provided but lacks detail, or this is distributed throughout other aspects of the portfolio, difficult to locate.
In particular:

Demonstrates correct understanding of all statistical measures.
States a research question(s) which lacks clarity.
States hypotheses which are suitable for testing using statistical test with some minor errors/lacking refinement.
Describes only the major aspects of a sample.
</td>
<td>Fails to address significant key concepts and issues and/or demonstrates serious misunderstanding of some. Fails to illustrate understanding through application to the dataset provided.
In particular:

No effort is made to describe the population and sample.
Research questions and hypotheses are either not included or contain significant errors which render them useless.
</td>
</tr>
</table>

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	Key Characteristics of Achievement Levels			
	Excellent	**Satisfactory**	**Basic**	**Unsatisfactory**
Explore	Demonstrates understanding of issues which inform the design and conduct of a statistical analysis. Demonstrates understanding of how to conduct an inspection of data and present the results of such an inspection. Illustrates understanding by conducting a coherent, comprehensive inspection of the dataset provided. In particular: • Selects/creates, with justification, appropriate measures suitable for use to investigate the research question identified and test hypotheses stated. • Demonstrates correct understanding of how to describe all statistical measures. • Selects appropriate assessments/tests to investigate issues identified. • Correctly interprets findings and draws appropriate conclusions. • Uses appropriate statistics and visualizations generated using the dataset provided to illustrate both understanding and application of understanding.	Demonstrates understanding of issues which inform the design and conduct of a statistical analysis. Demonstrates understanding of how to conduct an inspection of data and present the results of such an inspection. Lacks details for a small number of key issues/aspects of understanding. Illustrates understanding by conducting a coherent inspection of the dataset provided. In particular: • Selects/creates appropriate measures suitable for use to investigate the research question identified and test hypotheses stated. • Demonstrates correct understanding of how to describe all statistical measures. • Selects appropriate assessments/tests to investigate issues identified. • Correctly interprets findings and draws appropriate conclusions with very minor errors/omissions. • Uses appropriate statistics and visualizations generated using the dataset provided to illustrate both understanding and application of understanding.	Demonstrates understanding of a core set of issues which inform the design and conduct of a statistical analysis but lacks detail. Demonstrates understanding of how to conduct an inspection of data. Lacks detail/understanding is distributed throughout other aspects of the portfolio. Illustrates understanding of by conducting a coherent inspection of the dataset provided but lacks detail in places/inspection is distributed throughout the portfolio. In particular: • Selects appropriate assessments/tests to investigate issues identified. • Demonstrates correct understanding of how to describe all statistical measures. • Correctly interprets findings but lacks detail/includes minor particularly in choice of statistics and visualizations generated using the dataset provided to illustrate both understanding/application of understanding.	Fails to address common issues which can impact the conduct of a statistical analysis and interpretation of findings of a statistical analysis. No significant effort made to inspect the dataset provided. In particular: • Either no assessment/incorrect assessment of dataset included. • No interpretation/incorrect interpretation of findings included. • No/incorrect statistics and visualizations included.

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	Achievement Levels			
	Excellent	**Satisfactory**	**Basic**	**Unsatisfactory**
Analyze	Demonstrates understanding of each statistical test type and when/how to use them. Illustrates this understanding using the dataset provided. In particular: - Selects appropriate tests to test hypotheses stated with justification aligning with findings from the work done to meet the prepare and explore requirements [1]. - Conducts appropriate statistical tests to test hypotheses. - Correctly interprets tests findings and draws appropriate conclusions for the proposed statistical analysis. - Correctly reports reasons for test selection, test findings and conclusions using appropriate statistics and language. **[1]Correlation, difference two groups, difference more than two groups, relationship/difference nominal, repeated measures.**	Demonstrates understanding of each statistical test types and when/how to use them. Lacks details for a small number of key issues/aspects of understanding. Illustrates this understanding using the dataset provided. In particular: - Selects appropriate tests to test hypotheses with minor omissions in justification/lack of alignment with work done to meet the prepare and explore requirements[2]. - Conducts appropriate statistical tests to test hypotheses. - Correctly interprets tests findings and draws appropriate conclusions for the proposed statistical analysis. - Correctly reports reasons for test selection, test findings and conclusions using appropriate statistics and language with minor errors/omissions. **[2]Addresses at least correlation, difference two groups, difference more than two groups, relationship/difference nominal.**	Demonstrates understanding of a selection of statistical test types and when/how to use the or address all types of statistical test but lacks details for key aspects of understanding/understanding is distributed throughout other aspects of the portfolio. Illustrates this understanding using the dataset provided. In particular: - Selects appropriate tests to test hypotheses[3] but omits justification/justification lacks detail. - Conducts appropriate statistical tests to test hypotheses. - Correctly interprets tests findings and draws appropriate conclusions for the proposed statistical analysis. - Attempts to report test findings and conclusions using appropriate statistics and language with some errors/omissions. **[3]Addresses at least three of correlation, difference two groups, difference more than two groups, relationship/difference nominal.**	Fails to demonstrate understanding of major types of statistical test and their use. No significant effort made to illustrate this understanding by conducting a coherent, comprehensive inspection of the dataset provided. In particular: - Major errors in choice of tests included/omits major types of statistical test. - Incorrect/failure to conduct tests, interpret and report tests findings as required.

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		Achievement Levels		
	Excellent (3 techniques covered)	**Satisfactory (3 techniques covered)**	**Basic (at least 2 techniques covered)**	**Unsatisfactory**
Model	Demonstrates understanding of assumptions of the technique, when/how to use the technique, common issues and challenges that may occur when using the technique and how to address these, the statistics, visualizations and other information needed to be able to interpret the outcomes of using the technique. Illustrates understanding using the dataset provided. In particular: - Applies the technique as part of a statistical analysis taking cognizance of the outcomes of data exploration and analysis and addressing the common issues/assumptions of using the technique. - Interprets the findings, correctly reports the findings and draws appropriate conclusions for proposed hypotheses. - Reports on application and outcomes of technique using appropriate statistics, language and visualization. - Discusses the implications of findings for the research question(s) proposed.	Demonstrates understanding of assumptions of the technique, when/how to use the technique, common issues and challenges that may occur when using the technique and how to address these, the statistics, visualizations and other information needed to be able to interpret the outcomes of using the technique. Lacks details for a small number of key issues/aspects of understanding. Illustrates understanding using the dataset provided. In particular: - Applies the technique as part of a statistical analysis taking cognizance of the outcomes of data exploration and analysis and addressing the common issues/assumptions of using the technique with minor errors/omissions. - Interprets the findings, correctly reports the findings and draws appropriate conclusions for proposed hypotheses. - Reports on application and outcomes of technique using appropriate statistics, language and visualization with minor errors/omissions. - Discusses the implications of findings for the research question(s) proposed with minor errors/omissions.	For two of the three technique: Demonstrates understanding of assumptions of the technique, when/how to use the technique and some common issues and challenges that may occur when using the technique with some gaps/omissions. Lacks details for a small number of key issues/aspects of understanding or understanding is distributed throughout other aspects of the portfolio. Illustrates understanding using the dataset provided. In particular: - Applies the technique as part of a statistical analysis trying to address at least the assumptions of using the technique. - Interprets the findings and draws appropriate conclusions for proposed hypotheses. - Reports on application and outcomes of technique using appropriate statistics, language and visualization.	Fails to demonstrate understanding of techniques, when/how to use them. No significant effort made to illustrate understanding using dataset provided. In particular: - Major errors in application of technique(s) included/omits major aspect of application. - Incorrect/failure to interpret and report findings as required. May address only one technique or address more than one with very limited understanding and application demonstrated.

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	Achievement Levels			
	Excellent	**Satisfactory**	**Basic**	**Unsatisfactory**
Report	Clearly organized, thorough, and free of grammatical and spelling errors. Reflects the highest level of professionalism. Utilizes APA format correctly throughout.	Organized, clear with minimal spelling and grammatical errors. Reflects high professionalism. Utilizes APA format throughout with minimal errors.	Somewhat disorganized with some grammatical and spelling errors. Demonstrates a good effort to adopt required formats. Utilizes APA format with some errors/omissions for some aspects.	Very disorganized, several grammatical and spelling errors. Does not reflect a high level of professionalism. Does not utilize APA format.

	Achievement Levels			
	Excellent	**Satisfactory**	**Basic**	**Unsatisfactory**
Using R	The format and presentation of the R Code is clear and easy to follow. Illustrative comments included are helpful and included either to demonstrate the student's understanding or offer helpful direction to the reviewer. The code to support each section of the portfolio is easy to find, can be downloaded and executed without adaptation.	The format and presentation of the R Code is clear and easy to follow. Illustrative comments included for major components of work which offer helpful direction to the reviewer. The code to support each section of the portfolio can be located with little effort, can be downloaded and executed without adaptation.	The format and presentation of the R Code is not clear or easy to follow. Minimal comments included. The reviewer has difficulty locating and/or accessing code associated with a small number of elements of the portfolio. The code can be downloaded and executed with minor adaptation.	The format and presentation of the R Code is not clear or easy to follow. No comments included/copies comments included in instruction material. The reviewer has difficulty locating and/or accessing code/The code requires extensive adaptation in order to download and execute.