MIS770 Foundation Skills in Business Analysis

DEPARTMENT OF INFORMATION SYSTEMS AND BUSINESS ANALYTICS
DEAKIN BUSINESS SCHOOL
FACULTY OF BUSINESS AND LAW, DEAKIN UNIVERSITY

Assignment Two

Analysis of Medical Malpractice Claim Data

Particulars

- **Due:** Week 9, **8 pm, Thursday 17 September 2020**.
- **Marks:** 30%.
- **Words:** 2,000 words or approximate equivalent.
- **Submission:** Two files (Excel, Word) electronically in CloudDeakin.
  Email submissions **will not** be accepted.
  Note: Do not convert your Word document to pdf format.
- **Notes:** This assignment is to be completed individually.
  Please ensure you are familiar with the **Extension Request** and the **Late Penalties** rules governing assignments in the Faculty of Business and Law (see details below).

Assurance of Learning

This assignment assesses the following Graduate Learning Outcomes and related Unit Learning Outcomes:

Graduate Learning Outcome (GLO)	Unit Learning Outcome (ULO)
GLO4: Critical thinking: evaluating information using critical and analytical thinking and judgment	**ULO2:** Manipulate and summarise data that accurately represents real world problems **ULO3:** Interpret and appraise statistical output to assist in real-world decision making

Faculty of Business and Law Assignment Extension Procedures

Information for students seeking an extension BEFORE the due date

If you wish to seek an extension for this assignment prior to the due date, you need to apply directly to the Unit Chair by completing the **Assignment and Online Test Extension Application Form** (available from https://www.deakin.edu.au/students/faculties/buslaw/student-support/assignment-extensions) and sending the completed form as well as your supporting documentation and a **draft of your assignment**, to our generic email address T22020MIS770@deakin.edu.au. (**Note:** completing the Extension Application Form is **mandatory** if you wish to apply for an extension.)

This process needs to occur as soon as you become aware that you will have difficulty in meeting the due date, but **no later than 5-00 pm Thursday 17 September 2020**. In other words, requests for extensions will not be considered after the normal close of business on Thursday 17 September 2020.

Please note: Unit Chairs can only grant extensions up to **two weeks** beyond the original due date. If you require more than two weeks, or have already been provided an extension by the Unit Chair and require additional time, you must apply for Special Consideration via StudentConnect within 3 business days of the due date.

Misreading the due date/time, assignment anxiety or returning home will not be accepted as grounds for consideration.

Conditions under which an extension will normally be considered include:

- **Medical** – to cover medical conditions of a serious nature, e.g. hospitalisation, serious injury or chronic illness.
  Note: temporary minor ailments such as headaches, colds and minor gastric upsets are not serious medical conditions and are unlikely to be accepted. However serious cases of these may be considered.
- **Compassionate** – e.g. death of a close family member, significant family and relationship problems.
- **Hardship/Trauma** – e.g. sudden loss or gain of employment, severe disruption to domestic arrangements, victim of crime.

Information for students seeking an extension AFTER the due date

If the due date has passed and you require more than two weeks extension, or you have already been provided with an extension and require additional time, you must apply for Special Consideration via StudentConnect. Please be aware that applications are governed by University procedures and must be submitted within three business days of the due date or previously granted extension due date.

In most instances the maximum amount of time that can be granted for an assignment extension is three weeks after the due date, as Unit Chairs are required to have all assignments submitted before results/feedback can be released back to students.

Penalties for late submission

The following marking penalties will apply if you submit an assessment task after the due date without an approved extension:

- 5% will be deducted from the available marks for each day, or part thereof, up to five days.
- Work that is submitted more than five days after the due date will not be marked; you will receive 0% for the task.

Note: 'Day' means calendar day.

The Unit Chair may refuse to accept a late submission where it is unreasonable or impracticable to assess the task after the due date.

Additional information

For advice regarding academic misconduct, special consideration, extensions, and assessment feedback, please refer to the document "Rights and responsibilities as a student" in the "Unit Guide and Information" folder under the "Resources" section in the MIS770 CloudDeakin site.

Overview

The purpose of this assignment is to investigate a dataset utilising the knowledge learned in Modules One and Two. This will enable conclusions to be drawn that ultimately assist in decision making.

The assignment requires you to analyse a given dataset, interpret the results, and then draw conclusions such that you are able to reply to specific questions being asked of you in the form of a business report. (These questions are asked in the following memorandum).

The aims of the assignment are to:

- provide you with some examples of the application of data analysis
- test your understanding of the material presented in the relevant topics
- test your ability to analyse data and interpret your results
- test your ability to effectively communicate your results to others

Before attempting the assignment, make sure you have prepared yourself well. At a minimum, please read the relevant sections of the prescribed textbook and review the materials provided in Modules 1 and 2 (i.e. Topics 1 to 7).

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Scenario

According to a study published in the US News and World Report the cost of medical malpractice in the United States is $55.6 billion a year, which is 2.4 percent of annual health-care spending. Another 2011 study published in the New England Journal of Medicine revealed that annually, during the period 1991 to 2005, 7.4% of all physicians licensed in the US had a malpractice claim. These staggering numbers not only contribute to the high cost of health care, but the size of successful malpractice claims also contribute to high premiums for medical malpractice insurance.

A report from McKinsey (May 2013) Unleashing the Value of Advanced Analytics in Insurance states:

> *"The proliferation of third-party data sources is reducing insurers' dependence on internal data. Digital "data exhaust" from social media and multimedia, smartphones, computers, and other consumer and industrial devices – used within privacy guidelines and assuring anonymity – has become a rich source for behavioural insights for insurance companies, as it has for virtually all businesses.*
> *Recently, the release of previously unavailable or inaccessible public sector data has greatly expanded potential sources of third-party data. The US and UK governments and the European Union have recently launched "open data" Web sites to make available massive amounts of government statistics, including health, education, worker safety, and energy data, among others. With much better access to third-party data from a wide variety of sources, insurers can pose new questions and better understand many different types of risks."*

An insurance company in Australia has collated a range of data and wants to develop a better understanding of its claims paid out for medical malpractice lawsuits. Its records show claim payment amounts, as well as information about the presiding physician and the claimant for a number of adjudicated or settled lawsuits in this year.

The Data

The data set contains numerous variables and details about the claims. For the purpose of this assignment the data set has been simplified to nine variables with information about 200 randomly selected claims made this year.

The questions you need to answer are contained in the following memorandum.

Date: 24th August, 2020
To: Ellyse Perry, Analyst, iFastInsurance
From: Daisy Pearce, Manager, Medical negligence claims Team, iFastInsurance
Subject: Analysis of medical malpractice Claim Data

Dear Ellyse,

Can you please carry out an analysis of the medical malpractice Claim data (contained in the file (*MedMalLawsCliam Data.xlsx*) and prepare a report for me containing answers to the following questions.

My specific questions are:

Q1. An Overall View of both "Amount" and "severity rating of damage"
 Can you provide me with overall summaries of
 a) the amount of the claim payment in dollars?
 b) the severity rating of damage to the patient.

Q2. Relationships

 a) Is there a difference in 'MILD', 'MEDIUM' or 'SEVERE' claims when comparing males and females?
 b) Is there a relationship between the age of the claimant and the amount of the claim payment?
 c) The insurance company would like to get an understanding of the relationship between the speciality of the physician involved and claim amount.

I realise that the survey relates to a random sample of 200 claims paid out for medical malpractice lawsuits, and that this information can be used to draw inferences about all claims paid out for medical malpractice lawsuits by iFastInsurance. With that in mind, I hope you are able to provide me with answers to the following questions:

 Q3. The insurance company would like to get an estimate of the following.

 a) Average age of the claimant in years
 b) Proportion of claims made with a severity condition 'SEVERE'.

 Q4. The insurance company would like to compare this year's claims with the industry average.

 a) The industry average of amount of payment per claim is 68,000 dollars. Is this the same or different this year?
 b) Based on the industry average, less than 51% of the claimants are either divorced or widowed. Is it the same this year?

Q5. Appropriate Sample Size

 Finally, the General Manager of the insurance company is concerned that a sample of only 200 claimants seems too small to draw reliable inferences from. I am concerned that increasing the sample to 400 Australians would still be too small to provide accurate results. For a survey we intend to undertake next year, we would like your advice on the following:

 a) Should a large sample be collected? Does the precision of an estimate increase when a large sample is being used?
 b) What size sample should be taken to accurately estimate the average amount of claims per year to within 4,000 dollars?

I look forward to your responses.

Sincerely,

Daisy

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Business Report Requirements

- Your report should be no longer than 3 pages and should not include any charts and tables, or appendices in the report. Charts/graphics and tables are only to be placed in the Data Analysis file i.e. the Excel spreadsheet and not reproduced in the report.
- Suggested formatting for the report: single-line spacing; no smaller that 10- point font; page margins approx. 25mm, and good use of white space.
- Your report must have a cover sheet containing your particulars and Unit details.
- The report is to be written as a stand-alone document (assume Daisy will only read your report). Thus, you should not have any references in the report to your data analysis output. Eg. "According to Table 1 in the analysis…"
- Your report must contain an executive summary that explains in plain language the purpose of the report and summarises the main findings. The executive summary should be no more than 700 words long.
- The body of your report must be set out in the same order as in the originating memorandum from Daisy, with each section (question) clearly marked
- Use plain language and succinct explanations. Avoid the use of technical or statistical jargon as Daisy cannot be expected to understand statistical terminology. As a guide to the meaning of "Plain Language", imagine you are explaining your findings to a person without any statistical training (e.g. someone who has not studied this unit). What type of language would you use in this case?
- Marks will be lost if you use unexplained technical terms, irrelevant material, or have poor presentation/ organization
- All Microsoft Excel data analysis output associated with each question in the Memorandum are to be placed in the corresponding tab in the *T22020MIS770_A2_yourstudentid*.xlsx file

Data Analysis Instructions/Guidelines

In order to prepare a reply to Daisy's memorandum, you will need to examine and analyse the dataset *MedMalLawsClaimData.xlsx* thoroughly.

Daisy has asked a number of questions and your Data Analysis output (i.e. your charts/tables/graphs) should be structured such that you answer each question on the separate tab/worksheet provided in your Excel document. There are also three extra tabs in *MedMalLawsClaimData.xlsx* called CI, HT and SampleSize and you may use the various templates contained in these tabs arriving at your "Confidence Interval", "Hypothesis" and "Sample Size" answers, should you wish to do so.

Q1. An overall summary of Amount (in dollars) and summary of Severity

You are required to comprehensively describe the variable 'Amount' by itself and 'Severity' by itself using the most appropriate techniques from module 1.
Your analysis should include numerical summaries, graphs and tables. The importance of other variables is considered in other questions. You should thoroughly investigate relevant summary measures (and their reliability) for these two variables. Also, there may well be suitable tables and charts/graphs that will illustrate more clearly other important features of amount and severity. (See Topics 1-3 learning materials)

Q2. Descriptive measures and insights

Your course notes (Module One) give methods (numerical summaries/tables/graphs/charts) for summarising a single variable and investigating the relationships (dependencies) between two variables for these situations. For example
- Pie/Bar charts
- Summary/Frequency Distribution tables
- Comparative summary measures including quartiles and percentiles
- Scatter diagrams
- Coefficient of correlation, R^2 value
- Contingency tables/Cross tabs
- Stack bar charts, side-by-side bar charts
- Histograms/Frequency polygons/Ogives
- Single/Multiple box and whisker plots etc. (See Module One learning materials)
Use whatever techniques you have studied in Module 1 to investigate this matter. Generate suitable visualisations (Tables/Graphs/Charts) and numerical measure(s) demonstrating the existence or otherwise of a relationship. Remember to provide a brief overall summary when concluding these questions.

Q3-Q4 The analysis required involves inferential statistics, which are covered in Module 2.

Use the relevant Excel templates (CI and HT) provided in the Data file.
These questions will require you to complete either a confidence interval or a hypothesis test. Go through each of the questions asked by Daisy and decide which technique is the most appropriate. Below are some hints regarding the most appropriate technique:

- Do we have to make an estimate, and therefore need a confidence interval?
- Are we testing a theory/claim/ or comparing values… and therefore need a hypothesis test?

So decide which you think is the most appropriate technique (tutorials for topics 6 and 7 help here).

- You can assume that a 95% confidence level is appropriate.
- Use 5% significance in any hypothesis tests you perform, and provide a summary of your conclusions. Where appropriate, make comparisons with other levels of significance (e.g. 10%, 1%).
- To answer some questions you may need to make/check certain assumptions about the data set we are using. Mention these in your data analysis, where relevant. There is no need to mention this in the report.

Q5. Use the relevant Excel templates provided in the Data file.

- You should include comparisons for 90%, 95% and 99% and a recommendation the appropriate sample size.

Note: There is an Appendix at the end of each Chapter of the Prescribed Textbook which describes the basic Excel steps associated with that Topic. Chapters 1 to 9 are applicable for this assessment.

Other Guidelines:

- To answer some questions, you may need to make certain assumptions about the data set we are using. Mention these in your data analysis, where relevant. There is no need to mention this in the report.
- Please ensure you analyse the data thoroughly but do not go beyond what the question asks – for example, if one question requires comparison for the Gender classification, it does not mean you must do it for any other question, unless specifically asked to do so.
- We assume you will be using Excel to perform you data analysis.
- Detailed algebraic responses are not expected. Thus, avoid including extensive derivations, formulae, etc. You are to use Excel where possible to complete your answers.
- In your data analysis output you may include, as annotations, appropriate comments in either plain or technical language. These will be assumed to be your personal working comments.
- Overall, you will generate a great deal of output for this assignment, but you should trim it down to only show the most relevant results. Superfluous output will be penalised, so ensure you only include relevant materials (graphs, tables, calculations, tests, etc.) that are essential for writing up your report.
- Any of your computer work that is not useful should be discarded – your data analysis should only include computer output that is relevant to your report.
- Save your computer analysis frequently (every 10 to 15 minutes).

Submission

Your completed assignment should be submitted in two separate files:

- Business report (Part A): A Word document of no more than 3 pages that is **not** to contain any charts/tables/graphs. (Note: Do not submit a pdf document in lieu.). Please name your Word document ***T22020MIS770_A2_yourstudentid*.docx**
- Data Analysis (Part B): An Excel document containing separate tabs/worksheets with charts/tables/graphs for each question. Please note that all interpretations should be presented in your "Business Report" and the Excel document should only contain your intermediate analysis and final output. Please name your Excel document ***T22020MIS770_A2_yourstudentid*.xlsx**

The assignment is to be submitted to the MIS770 assignment box in Deakin's Cloud Campus before **8 pm, Thursday 17 September 2020**. Please ensure that you include your name and student details in your Word document as well following the above file naming convention. Failure to follow this convention may lead to a delay in receiving feedback and marks.

Marking Rubric

	Poor	Needs Improvement	Satisfactory	Good	Very Good	Excellent
Executive summary (Marks: 10)	0 points Does not communicate any of the main findings of the analysis in an accurate or useful way, or the findings are basic. 0 – 2.9 Marks	3 points Explains some main findings of the analysis accurately and enables reader to draw a few conclusions. 3 – 4.9 Marks	5 points Explains most of the main findings of the analysis accurately and enables reader to draw some reasonable conclusions. 5 – 5.9 Marks	6 points Explains nearly all of the main findings of the analysis accurately and enables reader to draw mostly reasonable conclusions. 6 – 6.9 Marks	7 points Provides detailed and accurate descriptions of the most important features of the analysis along with appropriately qualified conclusions. 7 – 7.9 Marks	10 points Provides outstanding descriptions and reaches conclusions that are carefully considered and insightful. 8 – 10 Marks
Data Analysis (Marks: 40) *This part relates to the various visualisations in the form of charts, tables & graphs etc. created by Ellyse which formed the basis of her response to Daisy.*	0 points Uses irrelevant or inappropriate techniques to analyse the data, or the Data Analysis and visualisation tools were used to analyse the data but in an incomplete or inaccurate manner. A very poor presentation of the analysis, or the analysis does not follow principles of good graphical display. 0 – 15.9 Marks	16 points Uses some appropriate data analysis and visualisation tools to analyse the data but there are many errors in the analysis. The presentation of the analysis needs improvement. 16 – 19.9 Marks	20 points Uses appropriate data analysis and visualisation tools to analyse the data but there are several errors in the analysis. The presentation of the analysis is satisfactory. 20 – 23.9 Marks	24 points Uses appropriate data analysis and visualisation tools to analyse the data but there are some errors in the analysis. The presentation of the analysis is of a respectable standard. 24 – 27.9 Marks	28 points Comprehensive analysis of the data using appropriate techniques, but there are some minor errors in the analysis. Uses data visualisations to understand the patterns in data. The analysis is well organised and follows principles of good graphical display. 28 – 31.9 Marks	40 points Skilful and comprehensive analysis of data using many different techniques. Uses data visualisations to produce novel insights. An excellent presentation of the analysis. 32 – 40 Marks
Business Report (Marks: 40) *This part is the written response by Ellyse to the questions posed by Daisy.*	0 points Does not communicate any of the main findings of the analysis in an accurate and/or useful way, or the interpretation and communication of findings is at a basic level. The written communication is unprofessional or difficult to follow and contains numerous errors. 0 – 15.9 Marks	16 points Explains some of the main findings of the analysis accurately which only enables the reader to draw a few reasonable conclusions. The written communication is not very easy to follow and/or it contains too many errors. 16 – 19.9 Marks	20 points Explains most of the main findings of the analysis accurately and enables the reader to draw several reasonable conclusions. The written communication is clear and easy to follow but it contains minor errors. 20 – 23.9 Marks	24 points Explains nearly all of the main findings of the analysis accurately and enables the reader to draw mostly reasonable conclusions. The written communication is clear and easy to follow and generally free of errors. 24 – 27.9 Marks	28 points Provides detailed and accurate descriptions of the most important features of the analysis along with appropriately qualified conclusions. The written communication is professional, easy to follow and has a good structure. 28 – 31.9 Marks	40 points Provides outstanding descriptions and conclusions that are carefully considered and insightful. The written communication is very professional, logical and easy to follow. 32 – 40 Marks

| Overall Assignment Presentation (Marks: 10) | 0 points

No attempt has been made to follow the assignment Requirements/ Instructions/ Guidelines.

Poorly presented

0 – 2.9 Marks | 3 points

Little attempt has been made to follow the assignment Requirements/ Instructions/ Guidelines.

Unsatisfactorily presented

3 – 4.9 Marks | 5 point

Majority of the assignment Requirements/ Instructions/ Guidelines have been followed.

Satisfactorily presented

5 – 5.9 Marks | 6 point

Nearly all of the assignment Requirements/ Instructions/ Guidelines have been followed.

Good presentation

6 – 6.9 Marks | 7 points

All of the assignment Requirements/ Instructions/ Guidelines have been followed.

Very good presentation

7 – 7.9 Marks | 10 points

All of the assignment Requirements/ Instructions/ Guidelines have been dealt with meticulously.

Faultless assignment presentation

8 – 10 Marks |
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