Monash University
Faculty of Information Technology
FIT5097 Business Intelligence Modelling
2nd Semester 2020

Assignment: Linear Programming, Sensitivity Analysis, Transshipment/Network Modelling and Integer Linear Programming - and Inventory Management - using Microsoft Excel Solver

This assignment is worth 30% of your final mark (subject to the hurdles described in the FIT5097 Moodle preview [or Unit Guide] and links therein). Among other things (see below), note the need to hit the `Submit' button (i.e., don't just leave your work in unsubmitted `draft' mode) and also note the requirement of an interview.

Due Date: Wednesday 14th October 2020, 11:45pm in time zone of Melbourne, Australia

Method of submission: Your submission should consist of 2 files:
1. A Microsoft Excel spreadsheet named as:
   FamilyName-StudentId-2ndSem2020FIT5097.xlsx
2. A text-based .pdf file named as: *FamilyName-StudentId-2ndSem2020FIT5097*.pdf

   Both the files must be uploaded on the FIT5097 Moodle site by the due date and time. The text-based .pdf file will undergo a similarity check by Turnitin at the time you submit to Moodle. Please read submission instructions on the last page carefully re use of Moodle.

Please read all instructions - including the notes below - carefully.

Total available marks = **100 marks**.

(60 + 32 + 10 = 102 marks are available. Any mark over 100 will be rounded down to 100.)

Note 1: Please recall the Academic Integrity exercises from week 1 and the start of semester. In submitting this assignment, you acknowledge both that you are familiar with the relevant policies, rules and regulations regarding Academic Integrity and also that you are familiar with the consequences of being deemed to be in contravention of these policies. Students are expected to do their own work and not to share their work. Among other things, students are reminded not to post even part of a proposed partial solution to a Moodle forum, Ed Discussions or other location. Students are reminded of the potentially serious consequences of being found guilty of an academic integrity violation. Put plain and simply, please take great care in this regard.

Note 2: It is your responsibility to be familiar with the special consideration policies and special consideration process - and also with other policies (e.g., academic integrity, etc).

Note 3: You will be required to be prepared to (present and) be interviewed about the work during lab/tute/studio time - to be determined by your lecturer and tutor, currently scheduled for week 10, but possibly to be scheduled for week 11. (Stay tuned for confirmation of the week of your compulsory Assignment interview.) This is a compulsory part of your assessment – only to be re-scheduled if you have an approved application for special consideration. Students should be familiar with the special consideration policies and the process for applying. Students who do not attend the scheduled assignment interview without valid approved grounds for special consideration will possibly be given a mark of 0 for the assignment - i.e., we reserve the right to give any such student a mark of 0 for their assignment in such cases. As previously advised, students should be familiar with the special consideration policies and the process for applying.

Note 4: As a general rule, don't just give a number or an answer like `Yes' or `No' without at least some clear and sufficient explanation - or, otherwise, you risk being awarded 0 marks for the relevant exercise. Evidence of working is expected to be shown. Make it easy for the person marking your work to follow your reasoning. Evidence of working includes - but is not limited to - *showing clearly relevant spreadsheet tabs for every question and sub-question requiring calculations*. Please

understand that a failure to require a spreadsheet tab when one is relevant for a question or sub-question could result in very few - or potentially even zero - marks for the relevant question or sub-question. Your .pdf should typically cross-reference the corresponding answer in your spreadsheet. For each sub-question and exercise, provide a clearly labelled spreadsheet tab with clear content and appropriate use of colours, accompanied with clearly cross-referenced clear .pdf explanation. Put another way, make sure that everything in your assignment is there, and make it easy for the marker to find it. Again, without clear cross-reference between .pdf and spreadsheet tab, there is the possibility that any such exercise will be awarded 0 marks.

Note 5: As a general rule, if there is an elegant way of answering a question - e.g., without unnecessarily re-running the Solver - then try to do it that way. (Recall, e.g., sensitivity report and some notions from Week 4.) More generally, more elegant solutions are preferable - and will at least sometimes be given more marks or perhaps many more marks. Among other things, if a problem is a linear programming (LP) problem, then it would be more elegant to solve it using a linear simplex model (than, e.g., a non-linear model) where possible. In similar vein, a linking constraint (where appropriate) will be far preferable to a seemingly equivalent use of the IF() function.

Note 6: All of your submitted work should be in machine readable form (in spreadsheet form or typed document), and none of your submitted work should be hand-written.

Note 7: If you wish for your work to be marked and not to accrue (possibly considerable and substantial) late penalties, then make sure to upload the correct files and (not to leave your files as `Draft' but) also to hit Submit to make sure that your work is submitted.

Note 8: The notation 1E-12 corresponds to 1 x 10^{-12}, or 0.000000000001. If you see a figure of approximately this magnitude or comparable magnitude, then consider whether or not it might be a small rounding error for something else. The notation 1E+30 corresponds to 1 x 10^{30}, or 1,000,000,000,000,000,000,000,000,000,000, but is often used in MicroSoft Excel to denote infinity.

Note 9: For all solutions involving integer constraints, first see whether you can get the optimal integer solution - and, that failing, see whether you can get an integer solution within a relatively small percentage (e.g., 1% or less, if possible) of the optimal relaxed solution (where the relaxed solution does not have the integer constraints). (The reason for the last sentence is an acknowledgment that obtaining the optimal integer solution typically requires much more run-time than obtaining the optimal relaxed solution.) At the very least, make it clear to the person marking your work exactly what you're doing, and why.

Question 1 – Linear Programming and variants [6 + 6 + 4 + 3 + 3 + 3 + 3 + 4 + 2 + 2 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 = 60 marks]

We use resources to make products. Consider 6 such resources and 5 such products. The various resources that we use might include (e.g.) linen, elastic, plastic, foam, etc. The various products that we make might include (e.g.) soap, sanitiser, washable masks, disposable masks, filters, shields, other personal protection equipment (PPE), etc. (Alternatively, the products might possibly be various graphical processing units - or GPUs - and the various resources might possiblybe Solder, Copper wire, Plastic, Aluminium, Bearings, Die size.)

We show below the profit of each product, the number of each resource required to make each product, and the total availability of each resource.

Unless we are explicitly told that a variable is integer-valued (or otherwise discrete-valued or binary, etc), it will probably be safer not to make such an assumption and rather instead allow the variable to be continuous-valued. (Note that sub-questions such as part 1m will occur later.) If unsure, clearly state and justify any assumptions. Please state such continuous values to at least three decimal places.

	Product 1	*Product 2*	*Product 3*	*Product 4*	*Product 5*	
Profit of Product	\$510	\$300	\$510	\$270	\$810	
						Resource Availability
Resource 1	2	10	2	3	6	2487
Resource 2	6	3	6	3	10	3030
Resource 3	2	3	10	6	2	5217
Resource 4	7	6	5	4	3	4000
Resource 5	5	6	3	10	2	4999
Resource 6	10	3	5	3	4	2769

We wish to produce products - given constraints - so as to optimise our objective function.

Bearing in mind the introductory material above, the questions follow below:

1a) Formulate a Linear Programming (an LP) model for this problem. Save your formulation in the text-based .pdf file [*FamilyName-YourStudentId-2ndSem2020FIT5097*.pdf]. (6 marks)

1b) Create a MicroSoft Excel spreadsheet model for this problem. Store the model in your Excel workbook [*FamilyName-YourStudentId-2ndSem2020FIT5097*.xlsx] and name your first Excel worksheet (spreadsheet tab) for this question something like (e.g.) 'LotsOfProducts 1b' (6 marks)

1c) Solve the problem - using Microsoft Excel Solver. Generate the Sensitivity report for the problem and name your Excel worksheet (spreadsheet tab) (e.g.) 'Qu 1b Sensitivity Rep'. (4 marks)

Using the Microsoft Excel Solver sensitivity report (as appropriate), provide answers (in the .pdf file) to the following questions: (**You must include explanations with your answers**.)

1d) What is the optimal production plan (X_1, X_2, X_3, X_4, X_5) and the associated profit? Refer to your answers to any of a), b) and/or c) above as appropriate. (3 marks)

For the remaining parts of this question, explain your answer(s), typically referring to relevant spreadsheet entry/ies and/or specific relevant parts of spreadsheet reports.

Throughout, recall note 4 above: ``**Note 4**: As a general rule, don't just give a number or an answer like `Yes' or `No' without at least some clear and sufficient explanation - or, otherwise, you risk being awarded 0 marks for the relevant exercise. Evidence of working is expected to be shown. Make it easy for the person marking your work to follow your reasoning. Evidence of working includes - but is not limited to - showing clearly relevant spreadsheet tabs for every question and sub-question requiring calculations. Please understand that a failure to require a spreadsheet tab when one is relevant for a question or sub-question could result in very few - or potentially even zero - marks for the relevant question or sub-question. Your .pdf should typically cross-reference the corresponding answer in your spreadsheet. For each sub-question and exercise, provide a clearly labelled spreadsheet tab with clear content and appropriate use of colours, accompanied with clearly cross-referenced clear .pdf explanation. Put another way, make sure that everything in your assignment is there, and make it easy for the marker to find it. Again, without clear cross-reference between .pdf and spreadsheet tab, there is the possibility that any such exercise will be awarded 0 marks.''

1e) Which constraints, if any, are binding? Refer to your answers to any of the above parts as appropriate, and explain your reasoning. (3 marks)

1f) The people running the company are now offered the opportunity of an exchange of goods.

The offer is for the company to receive 1 of Resource 2, 10 of Resource 4 and 100 of Resource 5 but for the company to have to relinquish (or surrender, or give away. or pay for these resources with) 10 of Resource 1, 5 of Resource 3 and 3 of Resource 6.
Should the company accept this offer?
Clearly explain with clear calculations (to at least 3 decimal places) how much money the company would gain or lose by agreeing to such an exchange, making it clear whether this would result in a gain or a loss.

Let us return to the original problem above (prior to the company being made an offer) from part d.
A proposal is put forward to produce a new product called Product 6.
Product 6 would have a profit of $155 and would require the following resources: 2 of Resource 2, 4 of Resource 4 and 5 of Resource 5.

1g) Would we expect Product 6 to be produced - i.e., if we are to produce products to optimise our objective function, would we produce any copies of this new product?
If we would expect Product 6 to be produced, then how much less profitable could Product 6 be and still be produced?
If we would not expect Product 6 to be produced, then how much more profitable would Product 6 need to be in order to be produced?

Let us again return to the original problem above from part d, where the profitability of the various products was (510, 300, 510, 270, 810).

Various employees at the company have considered making changes which would affect the profitability of various products.
One change would result in (512, 301, 511, 269, 811).

1h) Explaining your reasoning, when compared to your original answer using (510, 300, 510, 270, 810), would your optimal amount to be produced of each of Product1, ..., Product5 change? Explain clearly why or why not. And, if the amounts produced would change, explain clearly with any necessary or relevant calculations what they would change to.

1i) A second change, if it really could be carried out in practice, would double the values to become (1020, 600, 1020, 540, 1620).
Explaining your reasoning, when compared to your original answer using (510, 300, 510, 270, 810), would your optimal amount to be produced of each of Product1, ..., Product5 change? Explain clearly why or why not. And, if the amounts produced would change, explain clearly with any necessary or relevant calculations what they would change to.

1j) A third change, which would probably not be a good idea, would halve the values to become (255, 150, 255, 135, 405).
Nonetheless, if such a change were to take place then, explaining your reasoning, when compared to your original answer using (510, 300, 510, 270, 810), would your optimal amount to be produced of each of Product1, ..., Product5 change? Explain clearly why or why not. And, if the amounts produced would change, explain clearly with any necessary or relevant calculations what they would change to.

1k) Returning to the original problem and solution from part d, suppose we now introduce the requirement that Product1, Product2 and Product 5 must be produced in equal amounts.
Compared to the original feasible region (from part d), does adding this new requirement make the feasible region larger, stay the same, smaller, or something else? Clearly explain your answer.

1l part 1) Continuing from part k with this newly introduced requirement that Product1, Product2 and Product 5 must be produced in equal amounts, what is the optimal amount to be produced of each of Product1, Product2, Product3, Product4, Product5?

1l part 2) What is the resultant profit (stated to at least 3 decimal places)?

For both part 1 and part 2 of 1l, (in keeping with **note 4**,) clearly show all working.

Returning to the original problem from part d, suppose we now introduce the additional requirement that Product1, Product2, Product 3, Product 4 and Product 5 must be produced in integer amounts.

1m part 1) What is the optimal amount to be produced of each of Product1, Product2, Product3, Product4, Product5?

1m part 2) What is the optimal value of the objective function?

For both part 1 and part 2, (in keeping with **note 4**,) clearly show all working.

1n) Continuing on from part m above, assume the same unit profits as before but now with fixed start-up costs as given below.

Product	Product 1	Product 2	Product 3	Product 4	Product 5
Unit Profit	$510	$300	$510	$270	$810
Fixed-cost (Start-up cost)	2000	4000	8000	16000	1000

1n part 1) What is the optimal amount to be produced of each of Product1, Product2, Product3, Product4, Product5?

1n part 2) What is the optimal value of the objective function?

For both part 1 and part 2, (in keeping with **note 4**,) clearly show all working.

Return to part n above.

Suppose we now impose the additional constraint that, if Product3 is produced,
then there must be a minimum of 225 and a maximum of 325 of Product3 produced.

1o part 1) What is the optimal amount to be produced of each of Product1, Product2, Product3, Product4, Product5?

1o part 2) What is the optimal value of the objective function?

For both part 1 and part 2, (in keeping with **note 4**,) clearly show all working.

Return to part n above.

Suppose we now change the additional constraint from part 1o (immediately above) to be that, if Product3 is produced, then
there must be a minimum of 300 and a maximum of 450 Product 3 produced,
and (also) the amount produced of Product3 must also be a multiple of 50.

1p part 1) What is the optimal amount to be produced of each of Product1, Product2, Product3, Product4, Product5?

1p part 2) What is the optimal value of the objective function?

For both part 1 and part 2, (in keeping with **note 4**,) clearly show all working.

Return to part n above.

Now suppose that we introduce the requirement that, if Product 2 is produced, then the amount of Product 2 produced must be one of 102, 103, 105, 107, 111 and we also introduce the further additional requirement that, if Product 4 is produced, then the amount produced of Product4 must be one of 320, 330, 350, 370, 410.

1q part 1) What is the optimal amount to be produced of each of Product1, Product2, Product3, Product4, Product5?

1q part 2) What is the optimal value of the objective function?

For both part 1 and part 2, (in keeping with **note 4**,) clearly show all working.

Remove these most recent additional constraints and again return to part n above.

Suppose we now add the requirements that
Product1 and Product2 are produced in equal abundance,
Product4 and Product5 are produced in equal abundance,
if Product 3 is produced then neither product 1 nor product 2 is produced,
if Product 3 is produced then at least 10 and at most 100 of Product 5 are produced.

1r part 1) What is the optimal amount to be produced of each of Product1, Product2, Product3, Product4, Product5?

1r part 2) What is the optimal value of the objective function?

For both part 1 and part 2, (in keeping with **note 4**,) clearly show all working.

Throughout, recall note 4 above: ``**Note 4**: As a general rule, don't just give a number or an answer like `Yes' or `No' without at least some clear and sufficient explanation - or, otherwise, you risk being awarded 0 marks for the relevant exercise. Evidence of working is expected to be shown. Make it easy for the person marking your work to follow your reasoning. Evidence of working includes - but is not limited to - showing clearly relevant spreadsheet tabs for every question and sub-question requiring calculations. Please understand that a failure to require a spreadsheet tab when one is relevant for a question or sub-question could result in very few - or potentially even zero - marks for the relevant question or sub-question. Your .pdf should typically cross-reference the corresponding answer in your spreadsheet. For each sub-question and exercise, provide a clearly labelled spreadsheet tab with clear content and appropriate use of colours, accompanied with clearly cross-referenced clear .pdf explanation. Put another way, make sure that everything in your assignment is there, and make it easy for the marker to find it. Again, without clear cross-reference between .pdf and spreadsheet tab, there is the possibility that any such exercise will be awarded 0 marks.''

Question 2 – Transshipment and networks [2 + 3 + 6 + 4 + 3 + 3 + 3 + 3 + 3 + 2 = 32 marks]

Suppose we have a product (possibly masks, possibly shields, possibly containers of hand sanitiser) that we wish to move from two locations (let's call them node 1 and node 2, both with a supply of 75) to two other locations (let's call them node 7 and node 8, with demands of 80 and 70 respectively).

We initially assume the transportation costs along edges in the network to be as follows:

From	To	Unit Cost ($)
1	3	50
1	4	80
2	3	70
2	4	40
3	5	70
3	6	50
4	5	40
4	6	80
5	7	80
5	8	40
6	7	60
6	8	70

Students are expected and required to address question 2 in terms of linear programming (LP) and - if required - the closest possible variants.

2a) State the variables, and use these variables to state the objective function that we wish to optimise. (We assume that the cost is something that we wish to minimise.)

2b) How many variables are there? Informally in terms of the network, being as specific as you can, what do the variables correspond to?

2c) Solve the problem of the flow along edges giving the minimum cost.
Show the amounts of flow along the edges. State the value of the objective function.
State the number of edges with non-zero flow (and, for ease of reference, call this e_{2c}).

2d) Assuming that the number of edges with non-zero flow is less than e_{2c} (equivalently, less than or equal to $e_{2c} - 1$), again solve the problem of the flow along edges giving the minimum cost.
Show the amounts of flow along the edges. State the value of the objective function.
State the number of edges with non-zero flow.

2e) If the problem is to have a solution of finite cost (any possible solution at all) in which goods get from the source/supply/starting points to the demand/sink destination points, what is the smallest number of edges that can have non-zero flow for such a solution to occur?
Hint: One way of doing this is to introduce a very large penalty for each edge with non-zero flow.
In that case (if we require that only this smallest possible number of edges be used), what is the minimum such cost? (If you followed the *hint* immediately above, then make sure to remove the newly introduced large penalty when giving your answer.)

2f) Return to the problem from parts a, b and c above.
Due to maintenance problems along the edge between node 4 and node 5, the unit cost of using this edge is \$40/unit up to 30 units, then \$60/unit thereafter.
Show how to solve this problem. In keeping with **note 4**, solve this problem.

2g) Following on from part f above, due to further maintenance problems along the edge between node 4 and node 5, the unit cost of using this edge is \$40/unit up to 30 units, then \$60/unit up to 55 units (i.e., we could have 30 units @ \$40/unit and 25 units @ \$60/unit, as 30 + 25 = 55), then \$110/unit thereafter.

Show how to solve this problem. In keeping with **note 4**, solve this problem.

2h) We modify the original problem from parts a, b and c to be a shortest path problem. The edge costs (from parts a, b and c) should now be assumed to be the length of the edge. What is the shortest path from node 2 to node 8, and what is the length of the path?

Show how to solve this problem. In keeping with **note 4**, solve this problem.

2i part 1) Following on from part h, how would you modify your answer if we require that the path from node 2 to node 8 has to go through node 5?

2i part 2) Following on from part h, how would you modify your answer if we require that the path from node 2 to node 8 has to go through node 6?

Show how to solve this problem. In keeping with **note 4**, solve both parts of this problem.

Following on from the themes of part h and part i above, we now ask an open question worth bonus marks. (The motivation might be that someone has to collect face masks and shields on their way to a destination, but the order in which they collect them doesn't matter.)

2j) Suppose we have a start node (call it A), and a destination node (call it D) and two intermediate nodes (call them B and C respectively) that we have to go through. Suppose also that we are allowed to go A to B to C to D and we are also allowed to go A to C to B to D, and that this is not known or specified in advance. How might we set this up as a linear programming (LP) problem?

We do not require a complete solution for 2j immediately above but wish you to explain in detail how you would set this up.

Throughout, recall note 4 above: ``**Note 4**: As a general rule, don't just give a number or an answer like `Yes' or `No' without at least some clear and sufficient explanation - or, otherwise, you risk being awarded 0 marks for the relevant exercise. Evidence of working is expected to be shown. Make it easy for the person marking your work to follow your reasoning. Evidence of working includes - but is not limited to - showing clearly relevant spreadsheet tabs for every question and sub-question requiring calculations. Please understand that a failure to require a spreadsheet tab when one is relevant for a question or sub-question could result in very few - or potentially even zero - marks for the relevant question or sub-question. Your .pdf should typically cross-reference the corresponding answer in your spreadsheet. For each sub-question and exercise, provide a clearly labelled spreadsheet tab with clear content and appropriate use of colours, accompanied with clearly cross-referenced clear .pdf explanation. Put another way, make sure that everything in your assignment is there, and make it easy for the marker to find it. Again, without clear cross-reference between .pdf and spreadsheet tab, there is the possibility that any such exercise will be awarded 0 marks.''

Question 3 – Economic Order Quantity (EOQ) [10 marks]

Suppose that we have an ordering problem with variable costs.

We have a deterministic annual demand of 1000. The cost of placing an order (of any positive non-zero amount) is $21 for an order. The holding cost of storing items is 25% (or 1/4) per annum of the cost of the goods. (Equivalently, if we wish to change from a year's annual demand to the demand over 10 years in a decade, the deterministic demand in a decade would be 10,000 and the holding cost would be 250% of the cost of the goods. It will be safe to address the problem in terms of years rather than decades.) As many goods as required can be held in inventory indefinitely and not be thrown away.

The cost of each good is $4.00 up to 794 units ordered. If we order from 795 up to 1099, we get a 5% discount and the cost of each good is $3.80. If we order from 1100 up to 1859, we get an 8% discount and the cost of each good is $3.68. If we order 1860 or more, we get a 15% discount and the cost of each good is $3.40.

What is the optimal order quantity and the optimal total annual cost?

In keeping with **note 4**, clearly show all working.

A note about your Spreadsheet Model

When building your model, bear in mind the goals and guidelines for good spreadsheet design as discussed in Lecture 3. Marks are given for good spreadsheet design. Marks will possibly also be given for originality. Format both your models clearly with comments (and, if possible, shading), etc. so that it is easy for the user to distinguish which cells are occupied by decision variables, LHS and RHS constraints, and the objective function. Include a textbox in each worksheet that describes the formulation in terms of cell references in your model.

Instructions:

You are to upload your submission on the FIT5097 Moodle site and should include the following:

1. A text-based .pdf document (save as: FamilyName-StudentId-2ndSem2020FIT5097.pdf) that includes all your answers to Questions 1 and 2 and 3 (except for the Microsoft Excel Solver part of each question); and

2. A Microsoft Excel workbook (save as: FamilyName-StudentId-2ndSem2020FIT5097.xlsx) that includes the following spreadsheets:

i. the spreadsheet model for Question 1;
ii. Sensitivity Rep – the sensitivity report for the Question 1 model (and any other relevant parts);
iii. other relevant things (including any calculations) for Question 1;
iv. relevant things (including any calculations) for Question 2
v. relevant things (including any calculations) for Question 3
vi. etc.
vii. Anything else you deem sufficiently relevant.

Recall that, at the time you submit (1 and 2) to Moodle, the text-based .pdf will undergo a similarity check by Turnitin. This is done at the time you upload your assignment to Moodle. It is also our intention to perform such a check on your .xls/.xlsx file at the same time.

(This ends the submission instructions. Please read them and the notes on pages 1-2 carefully. Also recall that, as a general rule, when answering questions, don't just give a number or an answer like `Yes' or `No' without at least some clear and sufficient explanation.)

Late penalties:

Work submitted after the deadline (possibly with a small amount of grace time) will be subject to late penalties in accordance with the FIT5097 Unit Guide and Faculty and University policies, and (unless any of the following contravenes the relevant policies) certainly no less than 5% per calendar day, possibly as much as 10% per calendar day.
If you do not submit matching .pdf and .xls/.xlsx files (e.g., if you submit two files but one is blank or unreadable, or if you only submit one file), then your work will be deemed late - and will be subject to the relevant penalties, possibly receiving a mark of 0.
Work submitted 10 or more calendar days after the deadline will be given a mark of 0.

Plagiarism declaration:

You are required to state explicitly that you have done your own work, however the Moodle assignment submission details permit you to declare this.
For example, if you are presented with an 'Assignment Electronic Plagiarism Statement', then you are required to complete the 'Assignment Electronic Plagiarism Statement' quiz on the FIT5097 Moodle site and accept the Student Statement (electronic version of the Assignment cover sheet). If you do not accept the Student Statement, then your assignment may not be marked, and you may be given a mark of 0.

Recall instructions above and notes on pages 1 to 2 (including but not only, e.g., **Note 4**, Academic Integrity, Special Consideration, make sure to hit the `Submit' button, the scheduled interview is compulsory if you want a mark of greater than 0, etc.), and please follow these carefully.

And a reminder not to post even part of a proposed partial solution to even part of an item open for assessment to Ed Discussions, a Moodle forum or other public location. You are reminded that Monash University takes academic integrity very seriously.

*** END FIT5097 Assignment Faculty of I.T., Monash University 2nd semester 2020 ***