Course name: Mathematical Applications (T)	Assessment Item (AI) name: Assessment Item 3 – Investigations + Assignment T2	Student name: Line:
Unit name: 14113 Unit 3 Mathematical Applications	Weighting: 20% (Weighted together with briefs)	Teacher name: Serene Findlay-Steele
Unit value: 1.0	Due date: Week 18 Exam Week (June 13th – June 17th)	Semester 1, 2022 Term 2
Length: 2 weeks	Conditions: Take home task	

Instructions for Assessment Item
See attached documentation/instructions

Assessment Criteria:
You will be assessed on the degree to which you demonstrate:
- Knowledge, application, reasoning and communication

See rubric/assessment guide attached for detailed assessment criteria

Declaration of Originality:

1. The content of this AI is my own work and is not copied from any other source either electronic or printed
2. The AI does not contain content written by any other person except where specifically authorised by my teacher(s)
3. I hold a complete copy of this assignment and source material

Student Signature: ……………………………………………………………

If this task is submitted electronically, I certify that the above is true.

Teacher Copy

The assessment item was submitted to ………………………………………………...on ……………………………

Teacher Signature: ………………………………………………………………

Student Signature: …………………………………………………………….

Tear here

Student Copy

The assessment item was submitted to ………………………………………………...on ……………………………

Teacher Signature: ………………………………………………………………

Student Signature: …………………………………………………………….

Task 1   (10 marks total)

Robert wishes to buy a house and plans to borrow $800,000 with monthly repayments of $3,000 and a monthly interest rate of 0.20%.

a) Construct a difference equation which may be used to calculate the size of the debt at the end of each month.

b) Construct a spreadsheet which calculates the size of the debt each month (submit this part through GC).

c) From your spreadsheet, find how many months are required to fully repay the debt and how much is repaid in the last payment.

d) Calculate how much **interest** Robert has generated total from the loan.

e) Show that this sequence is neither arithmetic or geometric.

Task 2 **(10 marks total, 2 marks per question)**

a) Using the above map of Australia, create a network connecting each capital city to at least two other capital cities.

b) Draw an adjacency matrix for your resulting network.

c) Assign each edge a value based on the distance between the cities (you will need to research the distances online, assume you can draw a straight line between them)

d) What is the total 'weight' of your network?

e) From your graph, create a sub-graph with only Canberra, Perth and Darwin. What is the 'weight' of the subgraph?

Task 3   **(10 marks total, 2 marks per question)**
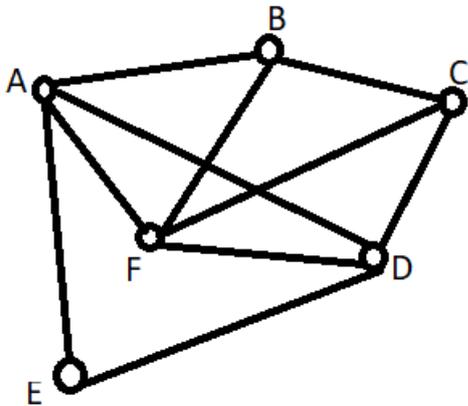
a)   List all the vertices and edges using set notation.

b)   Redraw this network in planar form, being sure to label all vertices.

c)   Verify Euler's formula holds for the planar form of the network.

d)   Is there an Euler Circuit for this network? If there is, list the path you found. If there isn't, explain how you know.

e)   Is there a Hamilton Circuit for this network? If there is, list the path you found. If there isn't, explain how you know.

Task 4   (10 marks)

It's time to catch up on Mathspace!

There are 4 Mathspace tasks that have been assigned for term 2, including the Revision task. Complete all four tasks and list their titles and the scores you received for them (if you have already completed them, you don't need to do them again. Just work on your other briefs!)

Mathspace task 1:

Mathspace task 2:

Mathspace task 3:

Mathspace task 4: