



2012 MATHEMATICAL APPLICATIONS, Semester 1

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SUPERVISOR CHECK

RE-MARKED

ATTACH SACE REGISTRATION NUMBER LABEL TO THIS BOX

Graphics calculator	<input type="checkbox"/>
Brand	_____
Model	_____
Computer software	<input type="checkbox"/>

Thursday 7 June: 9 a.m.
Time: 1½ hours

Pages: 12 Questions: 3

Topic 5: Optimisation

Examination material: two question booklets
two SACE registration number labels

Approved dictionaries, notes, calculators, and computer software may be used.

Instructions to Students

1. You will have 10 minutes to read the question booklets. You must not write in your question booklets or use a calculator during this reading time but you may make notes on the scribbling paper provided.
2. Each of the following five topics is printed in a separate question booklet. **Tick the boxes by the two topics you have studied in Semester 1:**
 - Topic 2: Investment and Loans
 - Topic 4: Matrices
 - Topic 5: Optimisation
 - Topic 6: Share Investments
 - Topic 7: Statistics and Working with Data.
3. The total mark for each topic is 35.
4. Answer **all** parts of Questions 1 to 3 in the spaces provided in this question booklet. There is no need to fill all the space provided.
5. Show all working in this booklet. (You are strongly advised **not** to use scribbling paper. Work that you consider incorrect should be crossed out with a single line.)
6. Write on page 12 if you need more space. Make sure to label each answer carefully.
7. Use only black or blue pens for all work other than graphs and diagrams, for which you may use a sharp dark pencil.
8. Appropriate steps of logic and correct answers are required.
9. Marks may be deducted if you do not clearly show all steps in the solution of problems, if your answers have an inappropriate number of decimal places, or if you use incorrect units.
10. Diagrams, where given, are not necessarily drawn to scale.
11. Complete the box on the top right-hand side of this page with information about the electronic technology you are using in this examination.
12. Attach one of your SACE registration number labels to the box at the top of this page.
13. At the end of the examination, place one question booklet inside the back cover of the other question booklet.

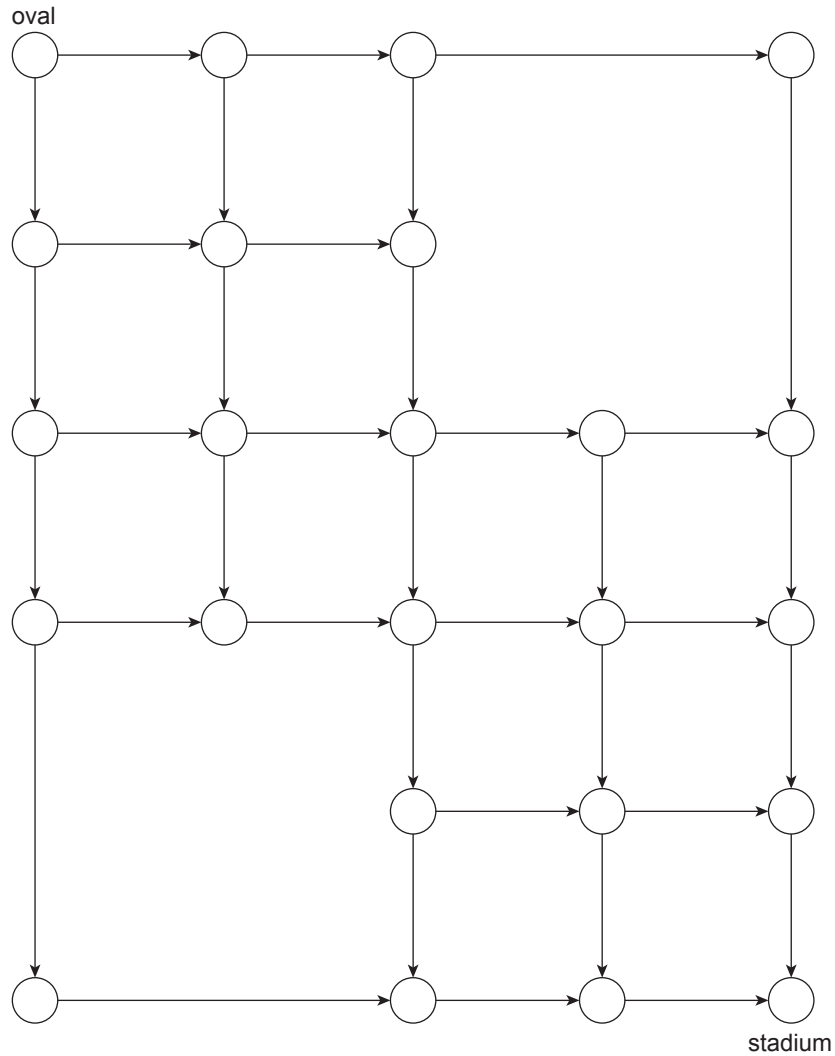
TOPIC 5

QUESTION 1

(a) The following network shows the possible routes between the oval and the stadium.

Using the network, calculate the maximum number of routes that a person could take when walking from the oval to the stadium.

Write the maximum number of routes in the box below.



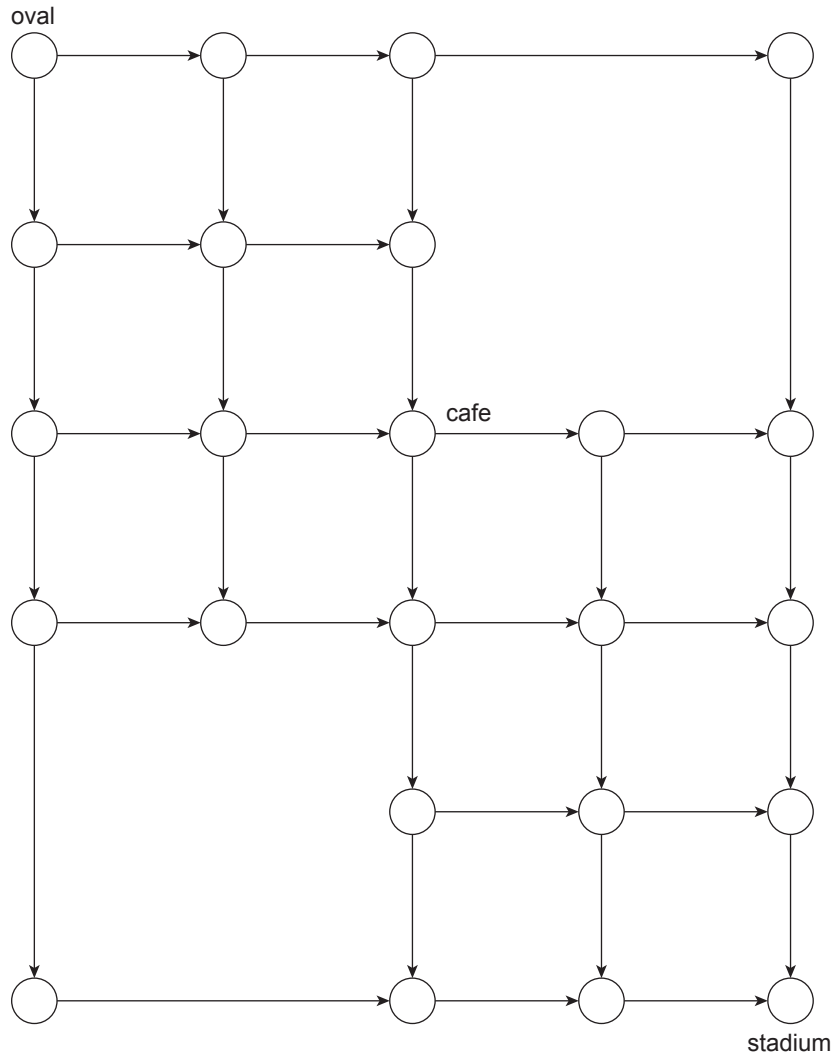
Maximum number of routes:

(2 marks)

- (b) A person who is planning to walk from the oval to the stadium intends to stop at the cafe on the way. The cafe is shown on the following network.

Using the network, calculate the maximum number of routes that the person could take if stopping at the cafe on the way.

Write the maximum number of routes in the box below.



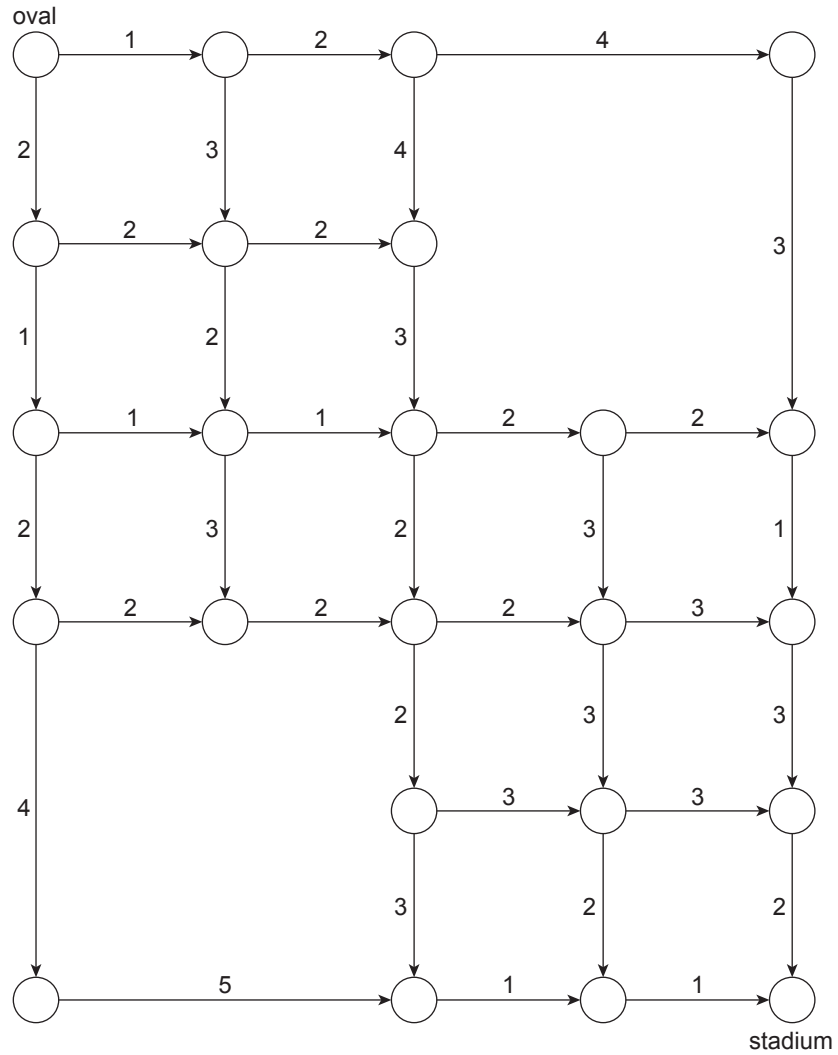
Maximum number of routes:

(2 marks)

(c) The numbers on the following network represent the length (in kilometres) of each path between the oval and the stadium.

(i) Calculate the shortest route between the oval and the stadium, and write the length of the shortest route in the box below. (1 mark)

(ii) Mark the shortest route on the network. (1 mark)

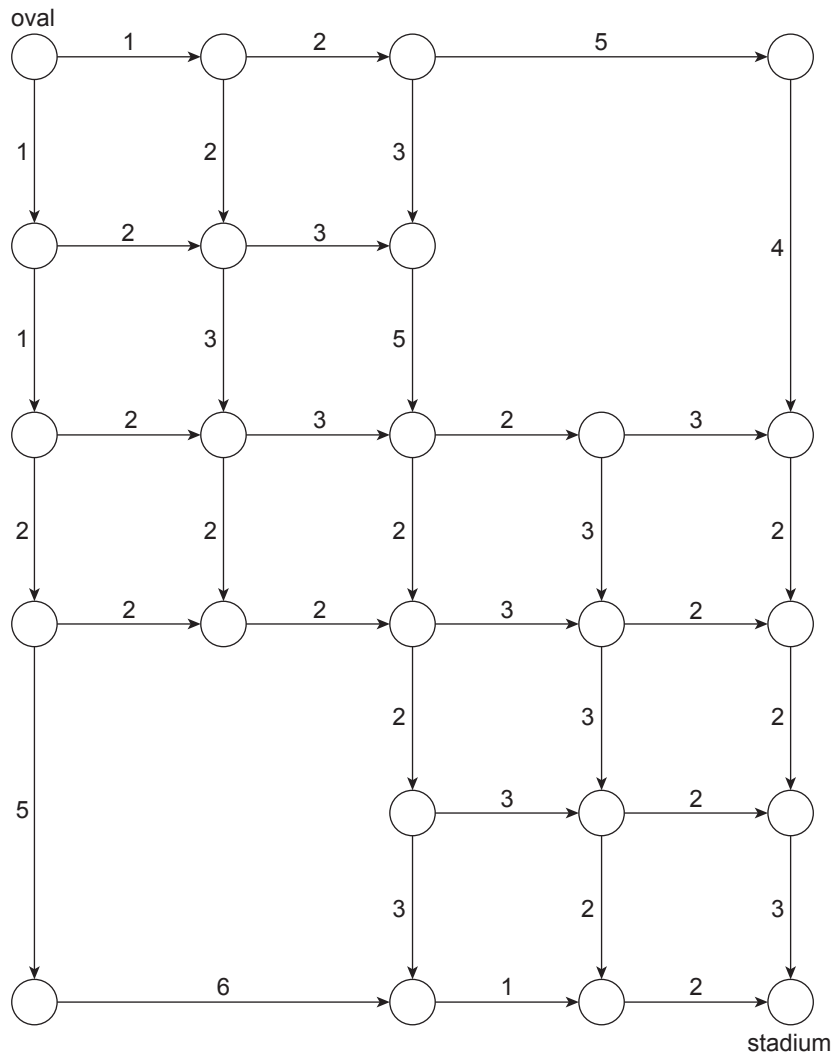


Length of shortest route: kilometres

(d) The numbers on the following network represent the time (in minutes) it takes to walk along each path between the oval and the stadium.

(i) Calculate the routes that take the shortest time to walk, and write the shortest time in the box below. (1 mark)

(ii) Mark on the network the routes that take the shortest time. (2 marks)



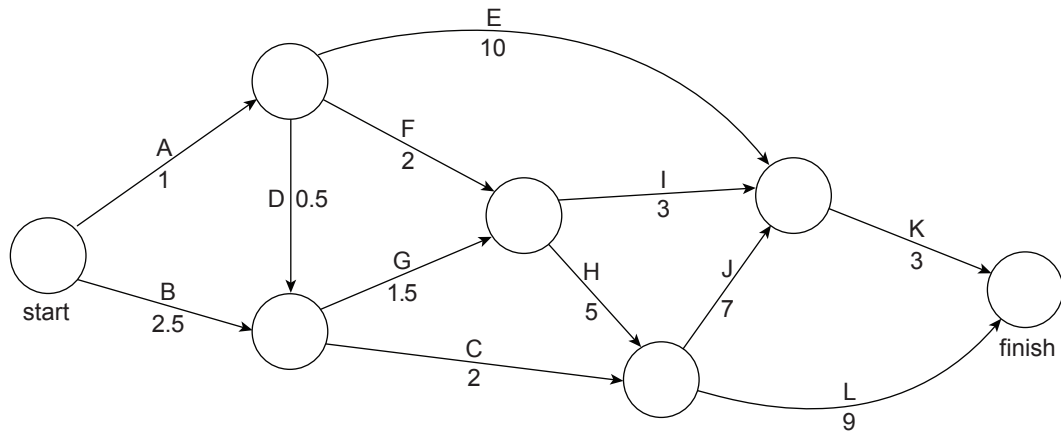
Shortest time: minutes

(e) Suggest *one* possible reason why the shortest route between the oval and the stadium is not the same as the routes that take the shortest time to walk.

(1 mark)

QUESTION 2

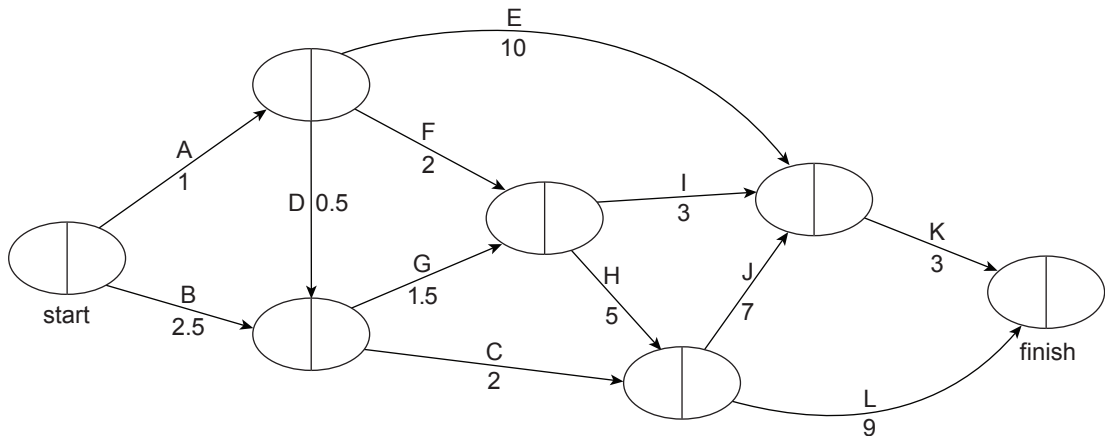
A client of a catering firm has placed a large order for a banquet. The firm uses a critical path analysis to ensure that the food will be ready to be served on time. The time needed to complete each stage of production (in hours) and the order for completion are shown on the following network:



(a) Using the following network:

- (i) find the minimum completion time (by completing a forward and backward scan) for the total production of the banquet, and write the minimum completion time in the box below. (2 marks)

- (ii) mark the critical path clearly on the network. (1 mark)



Minimum completion time: hours

(b) (i) Calculate the slack time for stage E of production.

(1 mark)

You may write on this page if you need more space to finish your answers to Topic 5.
Make sure to label each answer carefully (e.g. 'Question 2(d) continued').

A large grid of graph paper, consisting of 20 columns and 30 rows of small squares, intended for writing answers.