

Paper Reference 9FM0/3D  
Pearson Edexcel  
Level 3 GCE

|             |
|-------------|
| Total Marks |
|-------------|

Further Mathematics  
Advanced

PAPER 3D: Decision Mathematics 1

Friday 23 June 2023 – Afternoon  
Time: 1 hour 30 minutes

Answer Booklet

In the boxes below, write your name,  
centre number and candidate number.

|                  |  |  |  |  |  |
|------------------|--|--|--|--|--|
| Surname          |  |  |  |  |  |
| Other names      |  |  |  |  |  |
| Centre Number    |  |  |  |  |  |
| Candidate Number |  |  |  |  |  |

Read the instructions on the next page.

# INSTRUCTIONS

**Do not return the Question Paper with the Answer Booklet.**

**THIS ANSWER BOOKLET MUST BE  
RETURNED WITH THE  
DIAGRAM BOOKLET AT THE END OF  
THE EXAMINATION.**

**Turn over**

- 1. Refer to Diagram 1, Diagram 2 and Diagram 3 in the Diagram Booklet.**

**Answer lines continue on the next five pages.**

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**1. continued.**

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1. continued.

(e) Initial time matrix

|   | A | B | C | D | E |
|---|---|---|---|---|---|
| A | — |   |   |   |   |
| B |   | — |   |   |   |
| C |   |   | — |   |   |
| D |   |   |   | — |   |
| E |   |   |   |   | — |

(continued on the next page)

Turn over

1. (e) continued.

**Spare copy for Initial time matrix**

|   | A | B | C | D | E |
|---|---|---|---|---|---|
| A | — |   |   |   |   |
| B |   | — |   |   |   |
| C |   |   | — |   |   |
| D |   |   |   | — |   |
| E |   |   |   |   | — |

(continued on the next page)

**Turn over**

1. continued.

(f) Final iteration

|   | A | B | C | D | E |
|---|---|---|---|---|---|
| A | — |   |   |   |   |
| B |   | — |   |   |   |
| C |   |   | — |   |   |
| D |   |   |   | — |   |
| E |   |   |   |   | — |

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Turn over

1. (f) continued.

**Spare copy for Final iteration**

|   | A | B | C | D | E |
|---|---|---|---|---|---|
| A | — |   |   |   |   |
| B |   | — |   |   |   |
| C |   |   | — |   |   |
| D |   |   |   | — |   |
| E |   |   |   |   | — |

**(Total for Question 1 is 7 marks)**

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**Turn over**

- 2. Refer to Diagram 4, Diagram 5, Diagram 6 and Diagram 7 in the Diagram Booklet.**

**Answer lines continue on the next four pages.**

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2. continued.

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2. continued.

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Turn over

**(Total for Question 2 is 7 marks)**

**Turn over**

**3. Refer to Diagram 8 and Diagram 9 in the Diagram Booklet.**

**Answer lines continue on the next four pages.**

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**3. continued.**

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**(Total for Question 3 is 8 marks)**

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| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

Answer lines continue on the next  
eighteen pages.

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4. continued.

|    |    |    |    |    |   |
|----|----|----|----|----|---|
| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

|    |    |    |    |    |   |
|----|----|----|----|----|---|
| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

|    |    |    |    |    |   |
|----|----|----|----|----|---|
| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

|    |    |    |    |    |   |
|----|----|----|----|----|---|
| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

|    |    |    |    |    |   |
|----|----|----|----|----|---|
| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

|    |    |    |    |    |   |
|----|----|----|----|----|---|
| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

|    |    |    |    |    |   |
|----|----|----|----|----|---|
| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

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|----|----|----|----|----|---|
| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

|    |    |    |    |    |   |
|----|----|----|----|----|---|
| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

|    |    |    |    |    |   |
|----|----|----|----|----|---|
| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

|    |    |    |    |    |   |
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| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

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| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

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| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

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| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

|    |    |    |    |    |   |
|----|----|----|----|----|---|
| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

|    |    |    |    |    |   |
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| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

|    |    |    |    |    |   |
|----|----|----|----|----|---|
| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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4. continued.

|    |    |    |    |    |   |
|----|----|----|----|----|---|
| 15 | 22 | 3  | 9  | 23 | x |
| 5  | 4  | 18 | 20 | 13 |   |

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(Total for Question 4 is 12 marks)

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**5. Refer to Diagram 10 and Diagram 11  
in the Diagram Booklet.**

**Answer lines continue on the next  
twelve pages.**

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5. continued.

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**5. continued.**

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**(Total for Question 5 is 13 marks)**

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- 6. Refer to Diagram 12 and Diagram 13 in the Diagram Booklet.**

**Answer space and lines continue on the next seven pages.**

6. continued.

Turn over

6. continued.

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Turn over

6. continued.

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Turn over

**6. continued.**

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**(Total for Question 6 is 9 marks)**

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**7. Refer to Diagram 14 and Diagram 15  
in the Diagram Booklet.**

**Answer lines continue on the next  
seven pages.**

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**Turn over**

7. continued.

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7. continued.

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**7. continued.**

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**Turn over**

7. continued.

| b.v. | x | y | z |  |  |  |  |  |  | Value |
|------|---|---|---|--|--|--|--|--|--|-------|
|      |   |   |   |  |  |  |  |  |  |       |
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| P    |   |   |   |  |  |  |  |  |  |       |
| I    |   |   |   |  |  |  |  |  |  |       |

(continued on the next page)

Turn over

7. continued.

Spare copy

| b.v. | x | y | z |  |  |  |  |  |  |  | Value |
|------|---|---|---|--|--|--|--|--|--|--|-------|
|      |   |   |   |  |  |  |  |  |  |  |       |
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| P    |   |   |   |  |  |  |  |  |  |  |       |
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Parts (c), (d) and (e) to be answered on the following pages.

Turn over

7. continued.

| b.v. | x | y | z | s <sub>1</sub> | s <sub>2</sub> | s <sub>3</sub> | s <sub>4</sub> | Value | Row Ops |
|------|---|---|---|----------------|----------------|----------------|----------------|-------|---------|
|      |   |   |   |                |                |                |                |       |         |
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| P    |   |   |   |                |                |                |                |       |         |

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Turn over

7. continued.

Spare copy

| b.v. | x | y | z | s <sub>1</sub> | s <sub>2</sub> | s <sub>3</sub> | s <sub>4</sub> | Value | Row Ops |
|------|---|---|---|----------------|----------------|----------------|----------------|-------|---------|
|      |   |   |   |                |                |                |                |       |         |
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| P    |   |   |   |                |                |                |                |       |         |

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Turn over

**7. continued.**

**Answer lines continue on the next  
page.**

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**Turn over**

7. continued.

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(Total for Question 7 is 19 marks)

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**TOTAL FOR PAPER IS 75 MARKS**  
**END OF PAPER**

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