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| Write your name here                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Surname                                                                                                    | Other names                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Pearson</b><br><b>Edexcel GCE</b>                                                                       | <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">             Centre Number<br/> <div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto;"></div> </div> <div style="text-align: center;">             Candidate Number<br/> <div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto;"></div> <div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto;"></div> </div> </div> |
| <b>A level Mathematics</b><br><br><b>Practice Paper</b><br><b>Pure Mathematics - Newton-Raphson method</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>You must have:</b><br>Mathematical Formulae and Statistical Tables (Pink)                               | Total Marks<br><div style="border: 1px solid black; width: 60px; height: 40px; margin: 0 auto;"></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

### Instructions

- Use black ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- Fill in the boxes at the top of this page with your name, centre number and candidate number.
- Answer all the questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided – there may be more space than you need.
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- Inexact answers should be given to three significant figures unless otherwise stated.

### Information

- A booklet ‘Mathematical Formulae and Statistical Tables’ is provided.
- There are 4 questions in this question paper. The total mark for this paper is 25.
- The marks for each question are shown in brackets – use this as a guide as to how much time to spend on each question.
- Calculators must not be used for questions marked with a \* sign.

### Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

1.  $f(x) = 2x^{\frac{1}{2}} + x^{-\frac{1}{2}} - 5, \quad x > 0.$

(a) Find  $f'(x)$ .

(2)

The equation  $f(x) = 0$  has a root  $\alpha$  in the interval  $[4.5, 5.5]$ .

(b) Using  $x_0 = 5$  as a first approximation to  $\alpha$ , apply the Newton-Raphson procedure once to  $f(x)$  to find a second approximation to  $\alpha$ , giving your answer to 3 significant figures.

(4)

(Total 6 marks)

2.  $f(x) = x^2 + \frac{5}{2x} - 3x - 1, \quad x \neq 0.$

(a) Use differentiation to find  $f'(x)$ .

(2)

The root  $\alpha$  of the equation  $f(x) = 0$  lies in the interval  $[0.7, 0.9]$ .

(b) Taking 0.8 as a first approximation to  $\alpha$ , apply the Newton-Raphson process once to  $f(x)$  to obtain a second approximation to  $\alpha$ . Give your answer to 3 decimal places.

(4)

(Total 6 marks)

3.  $f(x) = x^2 + \frac{3}{4\sqrt{x}} - 3x - 7, \quad x > 0.$

A root  $\alpha$  of the equation  $f(x) = 0$  lies in the interval  $[3, 5]$ .

Taking 4 as a first approximation to  $\alpha$ , apply the Newton-Raphson process once to  $f(x)$  to obtain a second approximation to  $\alpha$ . Give your answer to 2 decimal places.

(Total 6 marks)

4.  $f(x) = x^3 - \frac{5}{2x^{\frac{3}{2}}} + 2x - 3, \quad x > 0$

(a) Show that the equation  $f(x) = 0$  has a root  $\alpha$  in the interval  $[1.1, 1.5]$ .

(2)

(b) Find  $f'(x)$ .

(2)

(c) Using  $x_0 = 1.1$  as a first approximation to  $\alpha$ , apply the Newton-Raphson procedure once to  $f(x)$  to find a second approximation to  $\alpha$ , giving your answer to 3 decimal places.

(3)

(Total 7 marks)

**TOTAL FOR PAPER: 25 MARKS**