

Write your name here

Surname					Other names							
Pearson					Centre Number				Candidate Number			
Edexcel GCE												
A level Mathematics												
Practice Paper												
Pure Mathematics - Newton-Raphson method												
You must have: Mathematical Formulae and Statistical Tables (Pink)										Total Marks		

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 α in the interval $[4.5, 5.5]$.

(b) Using $x_0 = 5$ as a first approximation to α , apply the Newton-Raphson procedure once to $f(x)$ to find a second approximation to α , 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 α of the equation $f(x) = 0$ lies in the interval $[0.7, 0.9]$.

(b) Taking 0.8 as a first approximation to α , apply the Newton-Raphson process once to $f(x)$ to obtain a second approximation to α . 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 α of the equation $f(x) = 0$ lies in the interval $[3, 5]$.

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

(Total 6 marks)

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

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

(2)

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

(2)

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

(3)

(Total 7 marks)

TOTAL FOR PAPER: 25 MARKS