Name: _____

GCSE (1 – 9)

Iteration

Instructions

• Use **black** ink or ball-point pen.
• Answer all questions.
• Answer the questions in the spaces provided
– *there may be more space than you need.*
• Diagrams are **NOT** accurately drawn, unless otherwise indicated.
• You must **show all your working out.**

Information

• The marks for each question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

• Read each question carefully before you start to answer it.
• Keep an eye on the time.
• Try to answer every question.
• Check your answers if you have time at the end

1. The equation $x^3 + 7x - 2 = 55$ has a solution between 3 and 4.

Use trial and improvement to find this solution.
Give your answer to 1 decimal place.

..... (4)

2. Use trial and improvement to solve $x^3 - x^2 = 85$

Give your answer to 1 decimal place.

..... (4)

3. Use trial and improvement to solve $x^3 + 5x = 70$

Give your answer to 1 decimal place.

..... (4)

4. An approximate solution to an equation is found using this iterative process:

$$x_{n+1}=\sqrt{(x_n)+10} \quad \text{and} \quad x_1=3$$

a) Work out the values of x_2 and x_3

.... (2)

b) Work out the solution to 3 decimal places

..... (1)

5. An approximate solution to an equation is found using this iterative process:

$$x_{n+1} = \frac{(x_n)^3 - 3}{8} \quad \text{and} \quad x_1 = -1$$

a) Work out the values of x_2 and x_3

.... (2)

b) Work out the solution to 6 decimal places

..... (1)

6. A sequence is defined by the term-to-term rule:

$$U_{n+1} = U_n^2 - 8U_n + 17$$

a) Given that $U_1 = 4$, find U_2 and U_3

.... (2)

b) Given instead that $U_1 = 2$, find U_2, U_3 and U_{100}

.... (3)

7.(a) Show that the equation $x^3+4x=1$ has a solution between $x=0$ and $x=1$

..... (2)

(b) Show that the equation $x^3+4x=1$ can be rearranged to give $x=\frac{1}{4}-\frac{x^3}{4}$

..... (1)

(c) Starting with $x_0=0$, use the iteration formula $x_{n+1}=\frac{1}{4}-\frac{x_n^3}{4}$ twice, to find an estimate to the solution of $x^3+4x=1$

..... (3)