ITERATION – PRACTICE QUESTIONS
CALCULATOR ALLOWED

1.

(a) Show that a solution to the equation $x^2 + 4x - 27 = 0$ lies between 3 and 4.

(b) Show that $x^2 + 4x - 27 = 0$ can be rearranged into the equation $x = \sqrt{27 - 4x}$.

(c) Using the iterative formula $x_{n+1} = \sqrt{27 - 4x_n}$ with $x_0 = 3$, find x_1, x_2, x_3 and x_4.

2.

(a) Show that a solution to the equation $x^2 - 3x - 9 = 0$ lies between 4 and 5.

(b) Show that $x^2 - 3x - 9 = 0$ can be rearranged into the equation $x = \sqrt{3x + 9}$.

(c) Using the iterative formula $x_{n+1} = \sqrt{3x_n + 9}$ with $x_0 = 2$, find x_1, x_2, x_3 and x_4.

3.

(a) Show that a solution to the equation $x^3 - 2x = 9$ lies between 2 and 3.

(b) Show that $x^3 - 2x = 9$ can be rearranged into the equation $x = \sqrt[3]{2x + 9}$.

(c) Using the iterative formula $x_{n+1} = \sqrt[3]{2x_n + 9}$.with $x_0 = 2$, use 3 iterations to find an estimate for the solution of $x^3 - 2x = 9$.

4.

(a) Show that a solution to the equation $x^3 + 10x = 8$ lies between 0 and 1.

(b) Show that $x^3 + 10x = 8$ can be rearranged into the equation $x = \frac{8-x^3}{10}$.

(c) Using the iterative formula $x_{n+1} = \frac{8-x_n{}^3}{10}$ with $x_0 = 0$ use 4 iterations to find an estimate for the solution of $x^3 + 10x = 8$.

5.

(a) Show that a solution to the equation $7x - x^2 - 8 = 0$ lies between 1 and 2.

(b) Show that $7x - x^2 - 8 = 0$ can be rearranged into the equation $x = \frac{x^2+8}{7}$.

(c) Using the iterative formula $x_{n+1} = \frac{{x_n}^2+8}{7}$ and a suitable value of x_0, find the solution of the equation $7x - x^2 - 8 = 0$ to 3 decimal places.

6.

(a) Show that a solution to the equation $12x - 3x^2 = 10$ lies between 1 and 2.

(b) Show that $12x - 3x^2 = 10$ can be rearranged into the equation $x = \frac{3x^2+10}{12}$.

(c) Using the iterative formula $x_{n+1} = \frac{3{x_n}^2+10}{12}$ and a suitable value of x_0, find the solution of the equation $12x - 3x^2 = 10$ to 2 decimal places.

7.

(a) Show that a solution to the equation $2x^2 + 7x - 31 = 0$ lies between 2 and 3.

(b) Show that $2x^2 + 7x - 31 = 0$ can be rearranged into the equation $x = \sqrt{\frac{31-7x}{2}}$.

(c) Using the iterative formula $x_{n+1} = \sqrt{\frac{31-7x_n}{2}}$ and a suitable value of x_0, find the solution of the equation $2x^2 + 7x - 31 = 0$ to 2 decimal places.

8.

(a) Show that a solution to the equation $3x^2 + 12x - 51 = 0$ lies between 2 and 3.

(b) Show that $3x^2 + 12x - 51 = 0$ can be rearranged into the equation $x = \sqrt{17 - 4x}$.

(c) Using the iterative formula $x_{n+1} = \sqrt{17 - 4x_n}$ and a suitable value of x_0, find the solution of the equation $3x^2 + 12x - 51 = 0$ to 3 significant figures.

9.

(a) Show that a solution to the equation $4x^3 - 15x = 75$ lies between 3.1 and 3.2.

(b) Show that $4x^3 - 15x = 75$ can be rearranged into the equation $x = \sqrt[3]{\frac{15x+75}{4}}$.

(c) Using the iterative formula $x_{n+1} = \sqrt[3]{\frac{15x_n+75}{4}}$ and a suitable value of x_0, find the solution of the equation $4x^3 - 15x = 75$ to 4 significant figures.

10.

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

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

(c) Using a suitable iterative formula and a suitable x_0, find the solution to 4 significant figures.

11.

(a) Show that a solution to the equation $x^3 + 9x^2 = 60$ lies between -9 and -8.

(b) Show that $x^3 + 9x^2 = 60$ can be rearranged into the equation $x = \frac{60}{x^2} - 9$.

(c) Using a suitable iterative formula and a suitable x_0, find the solution to 4 significant figures.

12.

(a) Show that a solution to the equation $x^3 + 6x - 11 = 0$ lies between 1 and 2.

(b) Show that $x^3 + 6x - 11 = 0$ can be rearranged into the equation $x = \frac{11}{x^2+6}$.

(c) Using a suitable iterative formula and a suitable x_0, find the solution to 4 significant figures.