

Task 1

- 1) Use the iteration formula,

$$x_{n+1} = 0.5(x_n + 6)$$

with $x_0 = 2$

Find the values of x_1 , x_2 , and x_3 .

- 2) Use the iteration formula,

$$x_{n+1} = \frac{x_n^2 + 5}{3}$$

with $x_0 = 1$

Find the values of x_1 , x_2 , and x_3 .

- 3) The temperature in $^{\circ}\text{C}$, of water in a kettle, t seconds after it is turned on is modelled by the equation

$$t_{n+1} = 1.13t_n + 4$$

Starting with $t_0 = 22$, work out the temperature of water in the kettle two seconds after it is turned on.

- 4) The number of people in a city, in millions, n days after the end of a sports event, is modelled by the formula

$$P_{n+1} = 1.2P_n - 3$$

Given $P_0 = 10$, work out how many people are in the city three days from now.

Task 2

- 5) Show that the equation $x^3 - x - 2 = 0$ has a solution between $x = 1$ and $x = 2$.
- 6) Show that the equation $x^2 - 5x + 4 = 0$ has a solution between $x = 0$ and $x = 2$.
- 7) Show that the equation $x^3 - 4x + 1 = 0$ has a solution between $x = 0$ and $x = 1$.
- 8) Show that the equation $x^2 + x - 4 = 2$ has a solution between $x = -1$ and $x = 3$.
- 9) Show that the equation $x^3 - 2x - 4 = 1$ has a solution between $x = 2$ and $x = 3$.

Task 3

10)

- a. Show that the equation $x^2 + x - 31 = 0$ can be rearranged into $x = \sqrt{31 - x}$
- b. Starting with $x_0 = 6$, use the iteration formula $x_{n+1} = \sqrt{31 - x_n}$ twice to find an estimate to the solution of $x^2 + x - 31 = 0$ to 3 decimal places.

11)

- a. Show that the equation $x^3 - 2 = x$ can be rearranged into $x = \sqrt[3]{x + 2}$
- b. Starting with $x_0 = 1$, use the iteration formula $x_{n+1} = \sqrt[3]{x_n + 2}$ three times to find an estimate to the solution of $x^3 - 2 = x$ to 2 decimal places.

12)

- a. Show that the equation $x^2 - 3x - 4 = 0$ can be rearranged into $x = \sqrt{3x + 4}$
- b. Starting with $x_0 = 2$, use the iteration formula $x_{n+1} = \sqrt{3x_n + 4}$ three times to find an estimate to the solution of $x^2 - 3x - 4 = 0$ to 2 decimal places.

Challenge

- 13) Find the solution to the equation

$$x^3 + 3x = 7$$

using the iteration formula

$$x_{n+1} = \sqrt[3]{7 - 3x_n}$$

and the initial value $x_0 = 1$

Give your answer to 2 decimal places.

- 14) Find the solution to the equation

$$x^3 + 4x = 10$$

using the iteration formula

$$x_{n+1} = \sqrt[3]{10 - 4x_n}$$

and the initial value $x_1 = 2$

Give your answer to 2 decimal places.