

- 1 The number of rabbits in a field  $t$  days from now is  $P_t$  where

$$P_0 = 220$$

$$P_{t+1} = 1.15(P_t - 20)$$

Work out the number of rabbits in the garden 3 days from now.

.....  
(Total for question 1 is 3 marks)

- 2 The number of people living in a town  $t$  years from now is  $P_t$  where

$$P_0 = 55000$$

$$P_{t+1} = 1.03(P_t - 800)$$

Work out the number of people in the town 3 years from now.

.....  
(Total for question 2 is 3 marks)

3 Using  $x_{n+1} = 3 + \frac{9}{x_n^2}$

With  $x_0 = 3$

Find the values of  $x_1$ ,  $x_2$  and  $x_3$ .

$$x_1 = \dots\dots\dots$$

$$x_2 = \dots\dots\dots$$

$$x_3 = \dots\dots\dots$$

---

**(Total for question 3 is 3 marks)**

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

With  $x_0 = 1$

Find the values of  $x_1$ ,  $x_2$  and  $x_3$ .

$$x_1 = \dots\dots\dots$$

$$x_2 = \dots\dots\dots$$

$$x_3 = \dots\dots\dots$$

---

**(Total for question 4 is 3 marks)**

- 5 Starting with  $x_0 = 3$ , use the iteration formula  $x_{n+1} = \frac{7}{x_n^2} + 2$  three times to find an estimate for the solution to  $x^3 - 2x^2 = 7$

.....  
(Total for question 5 is 3 marks)

- 6 Starting with  $x_0 = 0$ , use the iteration formula  $x_{n+1} = \frac{2}{x_n^2 + 3}$  three times to find an estimate for the solution to  $x^3 + 3x = 2$

.....  
(Total for question 6 is 3 marks)

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

With  $x_0 = 2.5$

(a) Find the values of  $x_1$ ,  $x_2$  and  $x_3$ .

$$x_1 = \dots\dots\dots$$

$$x_2 = \dots\dots\dots$$

$$x_3 = \dots\dots\dots$$

(3)

(b) Explain the relationship between the values of  $x_1$ ,  $x_2$  and  $x_3$  and the equation  $x^3 - 2x^2 - 5 = 0$

.....  
 .....  
 .....

(2)

**(Total for question 7 is 5 marks)**

- 8 (a) Show that the equation  $2x^3 - x^2 - 3 = 0$  has a solution between  $x = 1$  and  $x = 2$ .

(2)

- (b) Show that the equation  $2x^3 - x^2 - 3 = 0$  can be rearranged to give:  $x = \sqrt{\frac{3}{2x-1}}$

(1)

- (c) Starting with  $x_0 = 1$ , use the iteration formula  $x_{n+1} = \sqrt{\frac{3}{2x_n-1}}$  twice to find an estimate for the solution to  $2x^3 - x^2 - 3 = 0$

.....  
(3)

---

(Total for question 8 is 6 marks)

9 Using  $x_{n+1} = 1 + \frac{1}{x_n^2}$

With  $x_0 = 2$

(a) Find the values of  $x_1$ ,  $x_2$  and  $x_3$ .

$$x_1 = \dots\dots\dots$$

$$x_2 = \dots\dots\dots$$

$$x_3 = \dots\dots\dots$$

(3)

(b) Explain the relationship between the values of  $x_1$ ,  $x_2$  and  $x_3$  and the equation  $x^3 - x^2 - 1 = 0$

.....  
 .....  
 .....

(2)

**(Total for question 9 is 5 marks)**

**10** (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 for the solution to  $x^3 + 4x = 1$

.....  
(3)

---

(Total for question 10 is 6 marks)