Name: _____

ASM Tuition Academy

Iterations

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 you're 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 time.
- Try to answer every question.
- Check your answers if you have time at the end.

Q1- The number of pigeons in a field t days from now is P_t, where

$P_0 = 210$ $P_{t+1} = 1.10(P_t - 20)$

Work out the number of pigeons in the garden 3 days from now

.....

(Total for Question 1 is 3 marks)

Q2- The number of rabbits living in a town t years from now is P_t, where

$P_0 = 56000$

$P_{t+1} = 1.05(P_t - 800)$

Work out the number of rabbits in the town 3 years from now

.....

(Total for Question 2 is 3 marks)

Q3- Using $x_{n+1} = 4 + 16 / x^2_n$

With $x_0=4$

Find the values of x_1,x_2, and x_3.

X_1 = ...

X_2 = ...

X_3 = ...

(Total for Question 3 is 3 marks)

Q4- Using $x_{n+1}= 6 / (x^2_n +4)$

With $x_0=2$

Find the values of x_1,x_2, and x_3

X_1 = ...

X_2 = ...

X_3 = ...

(Total for Question 4 is 3 marks)

Q5- Starting with $x_0 = 3$, use the iteration formula $x_{n+1} = (8/x^2_n) + 3$ three times to find an estimate for the solution to $x^3 - 2x^2 = 22$

.....

(Total for Question 5 is 3 marks)

Q6- Starting with $x_0 = 0$, use the iteration formula $x_{n+1} = 3 / x^2_n + 4$ three times to find an estimate for the solution to $x^3 + 4x = 3$

.....

(Total for Question 6 is 3 marks)

Q7- Using $x_{n+1} = (6 / x^2_n) + 2$

With $x_0 = 2.8$

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

X_1 = ...

X_2 = ...

X_3 = ...

(3)

(b) Explain the relationship between the values of x_1, x_2, and x_3 and the equation $x^3 - 3x^2 - 7 = 0$

(2)

(Total for Question 7 is 5 marks)

Q8

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

(2)

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

(1)

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

(3)

(Total for Question 8 is 6 marks)

Q9- Using $x_{n+1} = 2 + 1 / x^2_n$

With $x_0=1$

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

X_1 = ...

X_2 = ...

X_3 = ...

(3)

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

(2)

(Total for Question 9 is 5 marks)

Q10

(a) Show that the equation $x^3+5x=1$ has a solution between x=0 and x=1

(2)

(b) Show that the equation $x^3+5x=1$ can be rearranged to give: $x= (1 / 5)- (x^3/5)$

(1)

(c) Starting with $x_0=0$, use the iteration formula $x_{n+1}= (1 / 5) – (x^3_n / 5)$ twice to find an estimate for the solution to $x^3+5x=1$

(3)

(Total for Question 10 is 6 marks)