

GCSE MATHS • GRADE 7

MATHS



MODEL ANSWERS

ITERATION

SCORE

/92

PERCENTAGE

%

STEM UP

- 1 Using $x_{n+1} = \sqrt[3]{4 - x_n}$
 with $x_0 = 2$
 Find the values of x_1 , x_2 and x_3 .
 Give each answer correct to 2 decimal places.

$$x_1 = 1.259921$$

$$x_2 = 1.399333$$

$$x_3 = 1.375186$$

1.26, 1.40, 1.38

1 / 1

- 2 Show that the equation $x^2 - 5x - 3 = 0$ has a solution between $x = 5$ and $x = 6$.

let $f(x) = x^2 - 5x - 3$
 $f(5) = -3$
 $f(6) = 3$
 change of sign so a solution between 5 and 6

Proved

1 / 1

- 3 The number of people living in a town n years from now is P_n where
 $P_0 = 38000$
 $P_{n+1} = 1.02(P_n - 800)$
 Work out the number of people in the town 3 years from now.
 Give your answer to the nearest whole number.

$$P_1 = 37944$$

$$P_2 = 37886.88$$

$$P_3 = 37828.618$$

37,829 people

1 / 1

- 4 Using $x_{n+1} = \sqrt{6 \div (x_n + 2)}$
 with $x_0 = 1$
 Find the values of x_1 , x_2 and x_3 .
 Give each answer correct to 3 decimal places.

$$x_1 = 1.414214$$

$$x_2 = 1.325654$$

$$x_3 = 1.343189$$

1.414, 1.326, 1.343

1 / 1

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

let $f(x) = x^3 - x - 3$
 $f(1) = -3$
 $f(2) = 3$
 change of sign so a solution between 1 and 2

Proved

1 / 1

- 6 The amount of medicine in a patient's blood, in mg, after n hours is P_n where
 $P_0 = 0$
 $P_{n+1} = 0.8P_n + 60$
 Work out the amount of medicine in the blood after 3 hours.
 Give your answer to the nearest whole number.

$$P_1 = 60$$

$$P_2 = 108$$

$$P_3 = 146.4$$

146 mg

1 / 1

- 7 Using $x_{n+1} = \sqrt{4x_n + 3}$
 with $x_0 = 4$
 Find the values of x_1 , x_2 and x_3 .
 Give each answer correct to 4 decimal places.

$$x_1 = 4.358899$$

$$x_2 = 4.520575$$

$$x_3 = 4.591546$$

4.3589, 4.5206, 4.5915

1 / 1

- 8 Show that the equation $x^2 - 6x - 10 = 0$ can be rearranged to give $x = \sqrt{6x + 10}$.

$$x^2 - 6x - 10 = 0$$

$$x^2 = 6x + 10$$

$$x = \sqrt{6x + 10}$$

Proved

1 / 1

- 9 The amount of medicine in a patient's blood, in mg, after n hours is P_n where
 $P_0 = 50$
 $P_{n+1} = 0.75P_n + 30$
 Work out the amount of medicine in the blood after 3 hours.
 Give your answer to the nearest whole number.

$$P_1 = 67.5$$

$$P_2 = 80.625$$

$$P_3 = 90.469$$

90 mg

1 / 1

- 10 Using $x_{n+1} = 5 + 7 \div x_n$
 with $x_0 = 6$
 Find the values of x_1 , x_2 and x_3 .
 Give each answer correct to 4 decimal places.

$$x_1 = 6.166667$$

$$x_2 = 6.135135$$

$$x_3 = 6.140969$$

6.1667, 6.1351, 6.1410

1 / 1

- 11 Show that the equation $x^3 + 4x = 6$ can be rearranged to give $x = 6 \div (x^2 + 4)$.

$$x^3 + 4x = 6$$

$$x(x^2 + 4) = 6$$

$$x = 6 \div (x^2 + 4)$$

Proved

1 / 1

- 12 The number of fish in a lake n months from now is P_n where
 $P_0 = 1000$
 $P_{n+1} = 1.1P_n - 200$
 Work out the number of fish in the lake 4 months from now.
 Give your answer to the nearest whole number.

$$P_1 = 900$$

$$P_2 = 790$$

$$P_3 = 669$$

$$P_4 = 535.9$$

536 fish

1 / 1

- 13 Starting with $x_0 = 2$, use the iteration formula
 $x_{n+1} = \sqrt[3]{12 - x_n}$
 twice to find an estimate for the solution to $x^3 + x = 12$
 Give your answer correct to 3 decimal places.

$$x_1 = 2.15443$$

$$x_2 = 2.14329$$

2.143

1 / 1

- 14 Show that the equation $x^2 - 3x - 4 = 0$ can be rearranged to give $x = \sqrt{3x + 4}$.

$$x^2 - 3x - 4 = 0$$

$$x^2 = 3x + 4$$

$$x = \sqrt{3x + 4}$$

Proved

1 / 1

- 15 The amount of medicine in a patient's blood, in mg, after n hours is P_n where
 $P_0 = 0$
 $P_{n+1} = 0.6P_n + 30$
 Work out the amount of medicine in the blood after 4 hours.
 Give your answer to the nearest whole number.

$$P_1 = 30$$

$$P_2 = 48$$

$$P_3 = 58.8$$

$$P_4 = 65.28$$

65 mg

1 / 1

- 16 Starting with $x_0 = 2$, use the iteration formula

$$x_{n+1} = \frac{9}{x_n^2 + 4}$$

twice to find an estimate for the solution to $x^3 + 4x = 9$

Give your answer correct to 2 decimal places.

$$x_1 = 1.12500$$

$$x_2 = 1.70920$$

1.71

1 / 1

- 17 Starting with $x_0 = 3$, use the iteration formula

$$x_{n+1} = \sqrt[3]{3x_n + 8}$$

three times to find an estimate for the solution to $x^3 - 3x - 8 = 0$

Give your answer correct to 3 decimal places.

$$x_1 = 2.57128$$

$$x_2 = 2.50473$$

$$x_3 = 2.49408$$

2.494

1 / 1

- 18 The number of fish in a lake n months from now is P_n where

$$P_0 = 1000$$

$$P_{n+1} = 1.3P_n - 200$$

Work out the number of fish in the lake 4 months from now.

Give your answer to the nearest whole number.

$$P_1 = 1100$$

$$P_2 = 1230$$

$$P_3 = 1399$$

$$P_4 = 1618.7$$

1,619 fish

1 / 1

- 19 Starting with $x_0 = 2$, use the iteration formula

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

three times to find an estimate for the solution to $x^3 + 2x = 3$

Give your answer correct to 2 decimal places.

$$x_1 = 0.50000$$

$$x_2 = 1.33333$$

$$x_3 = 0.79412$$

0.79

1 / 1

- 20 Starting with $x_0 = 5$, use the iteration formula

$$x_{n+1} = \sqrt{(3x_n + 12)}$$

four times to find an estimate for the solution to $x^2 - 3x - 12 = 0$

Give your answer correct to 3 decimal places.

$$x_1 = 5.19615$$

$$x_2 = 5.25247$$

$$x_3 = 5.26853$$

$$x_4 = 5.27310$$

5.273

1 / 1

- 21 The number of trout in a lake at the start of month n is P_n where

$$P_0 = 200$$

$$P_{n+1} = 1.3P_n - 20$$

Work out in which month the number of trout first exceeds 700.

$$P_1 = 240$$

$$P_2 = 292$$

$$P_3 = 359.6$$

$$P_4 = 447.5$$

$$P_5 = 561.7$$

$$P_6 = 710.2$$

first over 700 is month 6

month 6

2 / 2

22 Using $x_{n+1} = 2 + \frac{11}{x_n^2}$

with $x_0 = 3$

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

Give each answer correct to 4 decimal places.

(b) Explain the relationship between the values of x_1 , x_2 and x_3 and the equation $x^3 - 2x^2 - 11 = 0$

$$x_1 = 3.222222$$

$$x_2 = 3.059453$$

$$x_3 = 3.175182$$

the values are successive approximations to (converge to) a solution of the equation $x^3 - 2x^2 - 11 = 0$

(a) $x_1 = 3.2222$, $x_2 = 3.0595$, $x_3 = 3.1752$ (b) they get closer to a solution of $x^3 - 2x^2 - 11 = 0$

2 / 2

23 Using $x_{n+1} = \sqrt{5x_n + 13}$

with $x_0 = 7$

(a) Find the values of x_1 , x_2 and x_3 . Give each answer correct to 2 decimal places.

(b) Explain the relationship between the values of x_1 , x_2 and x_3 and the equation $x^2 - 5x - 13 = 0$

$$x_1 = 6.928203$$

$$x_2 = 6.902247$$

$$x_3 = 6.892839$$

(a) $x_1 = 6.93$, $x_2 = 6.90$, $x_3 = 6.89$ (b) The values get closer and closer to a solution of the equation, so each value is an approximation (estimate) for a solution of $x^2 - 5x - 13 = 0$

2 / 2

24 The number of trout in a lake at the start of month n is P_n where

$$P_0 = 300$$

$$P_{n+1} = 1.2P_n - 20$$

Work out in which month the number of trout first exceeds 800.

$$P_1 = 340$$

$$P_2 = 388$$

$$P_3 = 445.6$$

$$P_4 = 514.7$$

$$P_5 = 597.7$$

$$P_6 = 697.2$$

$$P_7 = 816.6$$

first over 800 is month 7

month 7

2 / 2

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

with $x_0 = 5$

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

Give each answer correct to 4 decimal places.

(b) Explain the relationship between the values of x_1 , x_2 and x_3 and the equation $x^3 - 4x^2 - 5 = 0$

$$x_1 = 4.200000$$

$$x_2 = 4.283447$$

$$x_3 = 4.272511$$

the values are successive approximations to (converge to) a solution of the equation $x^3 - 4x^2 - 5 = 0$

(a) $x_1 = 4.2000$, $x_2 = 4.2834$, $x_3 = 4.2725$ (b) they get closer to a solution of $x^3 - 4x^2 - 5 = 0$

2 / 2

26 Using $x_{n+1} = \sqrt[3]{(x_n + 4)}$

with $x_0 = 1$

(a) Find the values of x_1 , x_2 and x_3 . Give each answer correct to 2 decimal places.

(b) Explain the relationship between the values of x_1 , x_2 and x_3 and the equation $x^3 - x - 4 = 0$

$$x_1 = 1.709976$$

$$x_2 = 1.787357$$

$$x_3 = 1.795395$$

(a) $x_1 = 1.71$, $x_2 = 1.79$, $x_3 = 1.80$ (b) The values get closer and closer to a solution of the equation, so each value is an approximation (estimate) for a solution of $x^3 - x - 4 = 0$

2 / 2

27 The number of trout in a lake at the start of month n is P_n where

$$P_0 = 500$$

$$P_{n+1} = 1.3P_n - 30$$

Work out in which month the number of trout first exceeds 1000.

$$P_1 = 620$$

$$P_2 = 776$$

$$P_3 = 978.8$$

$$P_4 = 1242.4$$

first over 1000 is month 4

month 4

2 / 2

28 Using $x_{n+1} = 4 + \frac{9}{x_n^2}$

with $x_0 = 5$

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

Give each answer correct to 3 decimal places.

(b) Explain the relationship between the values of x_1 , x_2 and x_3 and the equation $x^3 - 4x^2 - 9 = 0$

$$x_1 = 4.360000$$

$$x_2 = 4.473445$$

$$x_3 = 4.449737$$

the values are successive approximations to (converge to) a solution of the equation $x^3 - 4x^2 - 9 = 0$

(a) $x_1 = 4.360$, $x_2 = 4.473$, $x_3 = 4.450$ (b) they get closer to a solution of $x^3 - 4x^2 - 9 = 0$

2 / 2

29 Using $x_{n+1} = \sqrt[3]{(x_n + 4)}$

with $x_0 = 2$

(a) Find the values of x_1 , x_2 and x_3 . Give each answer correct to 2 decimal places.

(b) Explain the relationship between the values of x_1 , x_2 and x_3 and the equation $x^3 - x - 4 = 0$

$$x_1 = 1.817121$$

$$x_2 = 1.798468$$

$$x_3 = 1.796544$$

(a) $x_1 = 1.82$, $x_2 = 1.80$, $x_3 = 1.80$ (b) The values get closer and closer to a solution of the equation, so each value is an approximation (estimate) for a solution of $x^3 - x - 4 = 0$

2 / 2

30 The number of trout in a lake at the start of month n is P_n where

$$P_0 = 300$$

$$P_{n+1} = 1.15P_n - 20$$

Work out in which month the number of trout first exceeds 500.

$$P_1 = 325$$

$$P_2 = 353.8$$

$$P_3 = 386.8$$

$$P_4 = 424.8$$

$$P_5 = 468.6$$

$$P_6 = 518.8$$

first over 500 is month 6

month 6

2 / 2

31 Using $x_{n+1} = 4 + \frac{6}{x_n^2}$

with $x_0 = 5$

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

Give each answer correct to 3 decimal places.

(b) Explain the relationship between the values of x_1 , x_2 and x_3 and the equation $x^3 - 4x^2 - 6 = 0$

$$x_1 = 4.240000$$

$$x_2 = 4.333749$$

$$x_3 = 4.319465$$

the values are successive approximations to (converge to) a solution of the equation $x^3 - 4x^2 - 6 = 0$

(a) $x_1 = 4.240$, $x_2 = 4.334$, $x_3 = 4.319$ (b) they get closer to a solution of $x^3 - 4x^2 - 6 = 0$

2 / 2

32 The equation $x^3 + 4x^2 = 12$ has a solution near $x = 2$.

Use the iteration formula $x_{n+1} = \sqrt{12 \div (x_n + 4)}$ with $x_0 = 2$ to find this solution correct to 2 decimal places.

You must show your iterations.

$$x_1 = 1.4142$$

$$x_2 = 1.4888$$

$$x_3 = 1.4786$$

$$x_4 = 1.4800$$

$$x_5 = 1.4798$$

$$\text{so } x = 1.48$$

$$x = 1.48$$

2 / 2

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

(b) Starting with $x_0 = 4$, use the iteration formula $x_{n+1} = \sqrt{3x_n + 9}$ three times to find an estimate for the solution.

Give your answer correct to 3 decimal places.

$$f(4) = -5$$

$$f(5) = 1$$

sign change

$$x_1 = 4.58258$$

$$x_2 = 4.76946$$

$$x_3 = 4.82787$$

(a) Proved (b) 4.828

2 / 2

- 34 (a) Show that the equation $x^3 + 9x = 4$ has a solution between $x = 0$ and $x = 1$.
- (b) Show that the equation $x^3 + 9x = 4$ can be rearranged to give $x = \frac{4}{9} - \frac{x^3}{9}$.
- (c) Starting with $x_0 = 0$, use the iteration formula $x_{n+1} = \frac{4}{9} - \frac{x_n^3}{9}$ twice to find an estimate for the solution to $x^3 + 9x = 4$
Give your answer correct to 3 decimal places.

$f(x) = x^3 + 9x - 4$
 $f(0) = -4$
 $f(1) = 6$
 sign change so a solution between 0 and 1
 $9x = 4 - x^3$
 $x = \frac{4}{9} - \frac{x^3}{9}$
 $x_1 = 0.44444$
 $x_2 = 0.43469$

(a) Proved (b) Proved (c) 0.435

2 / 2

- 35 The equation $x^2 - x - 8 = 0$ has a solution near $x = 3$.
Use the iteration formula $x_{n+1} = \sqrt{x_n + 8}$ with $x_0 = 3$ to find this solution correct to 2 decimal places.
You must show your iterations.

$x_1 = 3.3166$
 $x_2 = 3.3640$
 $x_3 = 3.3711$
 $x_4 = 3.3721$
 $x_5 = 3.3723$
 so $x = 3.37$

$x = 3.37$

2 / 2

- 36 (a) Show that the equation $x^3 - 2x - 2 = 0$ has a solution between $x = 1$ and $x = 2$.
(b) Starting with $x_0 = 1$, use the iteration formula $x_{n+1} = \sqrt[3]{2x_n + 2}$ three times to find an estimate for the solution.
Give your answer correct to 3 decimal places.

$f(1) = -3$
 $f(2) = 2$
 sign change
 $x_1 = 1.58740$
 $x_2 = 1.72968$
 $x_3 = 1.76081$

(a) Proved (b) 1.761

2 / 2

- 37 (a) Show that the equation $x^3 + 7x = 1$ has a solution between $x = 0$ and $x = 1$.
- (b) Show that the equation $x^3 + 7x = 1$ can be rearranged to give $x = \frac{1}{7} - \frac{x^3}{7}$.
- (c) Starting with $x_0 = 0$, use the iteration formula $x_{n+1} = \frac{1}{7} - \frac{x_n^3}{7}$ twice to find an estimate for the solution to $x^3 + 7x = 1$
Give your answer correct to 3 decimal places.

$f(x) = x^3 + 7x - 1$
 $f(0) = -1$
 $f(1) = 7$
sign change so a solution between 0 and 1
 $7x = 1 - x^3$
 $x = \frac{1}{7} - \frac{x^3}{7}$
 $x_1 = 0.14286$
 $x_2 = 0.14244$

(a) Proved (b) Proved (c) 0.142

2 / 2

- 38 The equation $x^3 - 3x^2 = 8$ has a solution near $x = 4$.
Use the iteration formula $x_{n+1} = 3 + 8 \div x_n^2$ with $x_0 = 4$ to find this solution correct to 2 decimal places.
You must show your iterations.

$x_1 = 3.5000$
 $x_2 = 3.6531$
 $x_3 = 3.5995$
 $x_4 = 3.6175$
 $x_5 = 3.6113$
 $x_6 = 3.6134$
 $x_7 = 3.6127$
 so $x = 3.61$

$x = 3.61$

2 / 2

- 39 (a) Show that the equation $x^3 + 4x^2 - 20 = 0$ has a solution between $x = 1$ and $x = 2$.
(b) Starting with $x_0 = 1$, use the iteration formula $x_{n+1} = \sqrt{20 \div (x_n + 4)}$ three times to find an estimate for the solution.
Give your answer correct to 3 decimal places.

$f(1) = -15$
 $f(2) = 4$
sign change
 $x_1 = 2.00000$
 $x_2 = 1.82574$
 $x_3 = 1.85285$

(a) Proved (b) 1.853

3 / 3

- 40 (a) Show that the equation $x^3 + 5x = 1$ has a solution between $x = 0$ and $x = 1$.
- (b) Show that the equation $x^3 + 5x = 1$ can be rearranged to give $x = \frac{1}{5} - \frac{x^3}{5}$.
- (c) Starting with $x_0 = 0$, use the iteration formula $x_{n+1} = \frac{1}{5} - \frac{x_n^3}{5}$ twice to find an estimate for the solution to $x^3 + 5x = 1$
Give your answer correct to 3 decimal places.

$f(x) = x^3 + 5x - 1$
 $f(0) = -1$
 $f(1) = 5$
 sign change so a solution between 0 and 1
 $5x = 1 - x^3$
 $x = \frac{1}{5} - \frac{x^3}{5}$
 $x_1 = 0.20000$
 $x_2 = 0.19840$

(a) Proved (b) Proved (c) 0.198

3 / 3

- 41 The equation $x^3 - 2x^2 = 2$ has a solution near $x = 3$.
Use the iteration formula $x_{n+1} = 2 + 2 \div x_n^2$ with $x_0 = 3$ to find this solution correct to 2 decimal places.
You must show your iterations.

$x_1 = 2.2222$
 $x_2 = 2.4050$
 $x_3 = 2.3458$
 $x_4 = 2.3635$
 $x_5 = 2.3580$
 $x_6 = 2.3597$
 $x_7 = 2.3592$
 $x_8 = 2.3593$
 so $x = 2.36$

$x = 2.36$

3 / 3

- 42 (a) Show that the equation $x^3 + x - 15 = 0$ has a solution between $x = 2$ and $x = 3$.
(b) Starting with $x_0 = 2$, use the iteration formula $x_{n+1} = \sqrt[3]{15 - x_n}$ three times to find an estimate for the solution.
Give your answer correct to 3 decimal places.

$f(2) = -5$
 $f(3) = 15$
 sign change
 $x_1 = 2.35133$
 $x_2 = 2.32996$
 $x_3 = 2.33127$

(a) Proved (b) 2.331

3 / 3

- 43 (a) Show that the equation $2x^3 - x^2 - 5 = 0$ has a solution between $x = 1$ and $x = 2$.
 (b) Show that the equation $2x^3 - x^2 - 5 = 0$ can be rearranged to give $x = \sqrt{5 \div (2x - 1)}$.
 (c) Starting with $x_0 = 1$, use the iteration formula $x_{n+1} = \sqrt{5 \div (2x_n - 1)}$ twice to find an estimate for the solution to $2x^3 - x^2 - 5 = 0$
 Give your answer correct to 3 decimal places.

let $f(x) = 2x^3 - x^2 - 5$
 $f(1) = -4$
 $f(2) = 7$
 change of sign so a solution between 1 and 2
 (b) $2x^3 - x^2 - 5 = 0$
 $2x^3 - x^2 = 5$
 $x^2(2x - 1) = 5$
 $x^2 = 5 \div (2x - 1)$
 $x = \sqrt{5 \div (2x - 1)}$
 (c) $x_1 = 2.23607$
 $x_2 = 1.20001$

(a) Proved (b) Proved (c) 1.200

3 / 3

- 44 (a) Show that the equation $x^3 - x - 1 = 0$ has a solution between $x = 1$ and $x = 2$.
 (b) Starting with $x_0 = 1$, use the iteration formula $x_{n+1} = \sqrt[3]{x_n + 1}$ three times to find an estimate for the solution.
 Give your answer correct to 3 decimal places.

$f(1) = -1$
 $f(2) = 5$
 sign change
 $x_1 = 1.25992$
 $x_2 = 1.31229$
 $x_3 = 1.32235$

(a) Proved (b) 1.322

3 / 3

- 45 (a) Show that the equation $x^2 - 4x - 4 = 0$ has a solution between $x = 4$ and $x = 5$.
 (b) Starting with $x_0 = 4$, use the iteration formula $x_{n+1} = \sqrt{4x_n + 4}$ three times to find an estimate for the solution.
 Give your answer correct to 3 decimal places.

$f(4) = -4$
 $f(5) = 1$
 sign change
 $x_1 = 4.47214$
 $x_2 = 4.67852$
 $x_3 = 4.76593$

(a) Proved (b) 4.766

3 / 3

- 46 (a) Show that the equation $x^3 + 6x = 2$ has a solution between $x = 0$ and $x = 1$.
 (b) Show that the equation $x^3 + 6x = 2$ can be rearranged to give $x = (2 - x^3) \div 6$.
 (c) Starting with $x_0 = 0$, use the iteration formula $x_{n+1} = (2 - x_n^3) \div 6$ three times to find an estimate for the solution to $x^3 + 6x = 2$
 Give your answer correct to 3 decimal places.

$$\text{let } f(x) = x^3 + 6x - 2$$

$$f(0) = -2$$

$$f(1) = 5$$

change of sign so a solution between 0 and 1

$$(b) x^3 + 6x = 2$$

$$6x = 2 - x^3$$

$$x = (2 - x^3) \div 6$$

$$(c) x_1 = 0.33333$$

$$x_2 = 0.32716$$

$$x_3 = 0.32750$$

(a) Proved (b) Proved (c) 0.327

3 / 3

- 47 (a) Show that the equation $x^3 - 3x^2 - 6 = 0$ has a solution between $x = 3$ and $x = 4$.
 (b) Starting with $x_0 = 3$, use the iteration formula $x_{n+1} = 3 + 6 \div x_n^2$ three times to find an estimate for the solution.
 Give your answer correct to 3 decimal places.

$$f(3) = -6$$

$$f(4) = 10$$

sign change

$$x_1 = 3.66667$$

$$x_2 = 3.44628$$

$$x_3 = 3.50518$$

(a) Proved (b) 3.505

3 / 3

- 48 (a) Show that the equation $x^3 + 4x^2 = 10$ has a solution between $x = 1$ and $x = 2$.
 (b) Show that the equation $x^3 + 4x^2 = 10$ can be rearranged to give $x = \sqrt{10 \div (x + 4)}$.
 (c) Starting with $x_0 = 1$, use the iteration formula $x_{n+1} = \sqrt{10 \div (x_n + 4)}$ three times to find an estimate for the solution to $x^3 + 4x^2 = 10$
 Give your answer correct to 3 decimal places.

$$\text{let } f(x) = x^3 + 4x^2 - 10$$

$$f(1) = -5$$

$$f(2) = 14$$

change of sign so a solution between 1 and 2

$$(b) x^3 + 4x^2 = 10$$

$$x^2(x + 4) = 10$$

$$x^2 = 10 \div (x + 4)$$

$$x = \sqrt{10 \div (x + 4)}$$

$$(c) x_1 = 1.41421$$

$$x_2 = 1.35904$$

$$x_3 = 1.36602$$

(a) Proved (b) Proved (c) 1.366

3 / 3

- 49 (a) Show that the equation $x^3 + 2x^2 = 32$ has a solution between $x = 2$ and $x = 3$.
 (b) Show that the equation $x^3 + 2x^2 = 32$ can be rearranged to give $x = \sqrt{(32 \div (x + 2))}$.
 (c) Starting with $x_0 = 2$, use the iteration formula $x_{n+1} = \sqrt{(32 \div (x_n + 2))}$ twice to find an estimate for the solution to $x^3 + 2x^2 = 32$
 Give your answer correct to 3 decimal places.

$$\text{let } f(x) = x^3 + 2x^2 - 32$$

$$f(2) = -16$$

$$f(3) = 13$$

change of sign so a solution between 2 and 3

$$(b) x^3 + 2x^2 = 32$$

$$x^2(x + 2) = 32$$

$$x^2 = 32 \div (x + 2)$$

$$x = \sqrt{(32 \div (x + 2))}$$

$$(c) x_1 = 2.82843$$

$$x_2 = 2.57438$$

(a) Proved (b) Proved (c) 2.574

3 / 3

- 50 (a) Show that the equation $x^3 + 2x^2 = 31$ has a solution between $x = 2$ and $x = 3$.
 (b) Show that the equation $x^3 + 2x^2 = 31$ can be rearranged to give $x = \sqrt{(31 \div (x + 2))}$.
 (c) Starting with $x_0 = 2$, use the iteration formula $x_{n+1} = \sqrt{(31 \div (x_n + 2))}$ three times to find an estimate for the solution to $x^3 + 2x^2 = 31$
 Give your answer correct to 3 decimal places.

$$\text{let } f(x) = x^3 + 2x^2 - 31$$

$$f(2) = -15$$

$$f(3) = 14$$

change of sign so a solution between 2 and 3

$$(b) x^3 + 2x^2 = 31$$

$$x^2(x + 2) = 31$$

$$x^2 = 31 \div (x + 2)$$

$$x = \sqrt{(31 \div (x + 2))}$$

$$(c) x_1 = 2.78388$$

$$x_2 = 2.54560$$

$$x_3 = 2.61147$$

(a) Proved (b) Proved (c) 2.611

3 / 3