

Iteration *stretch*

ANSWERS 

1



Show that $x^3 + 5x - 4 = 0$ can be

written as $x = \frac{4}{x^2 + 5}$

$$x(x^2 + 5) = 4$$

divide both sides by $x^2 + 5$

shown

Reason

2



Use $x_{n+1} = \frac{4}{x_n^2 + 5}$ with $x_0 = 1$ to find a solution of $x^3 + 5x - 4 = 0$ to 2 decimal places.

$$0.6667, 0.7347, 0.7221, \dots$$

0.7221 and 0.7245 agree to 2 d.p.

$$x = 0.72$$

Answer

3



Show that $x^3 - 3x - 5 = 0$ has a solution between $x = 2.2$ and $x = 2.3$

$$x = 2.2: -0.952$$

$$x = 2.3: 0.267$$

sign change

Reason

4



Each day a body clears 30% of a medicine, then a 60 mg dose is taken, so $D_{n+1} = 0.7D_n + 60$, with $D_0 = 60$. Find D_3 .

$$D_1 = 102.0, D_2 = 131.4$$

$$D_3 = 0.7 \times 131.4 + 60$$

$$151.98 \text{ mg}$$

Answer

5



$x_{n+1} = \sqrt{x_n + k}$ with $x_0 = 2$ gives $x_1 = 3$. Find k , then work out x_2 to 3 decimal places.

$$\sqrt{2 + k} = 3, \text{ so } 2 + k = 9$$

$$x_2 = \sqrt{3 + 7}$$

$$k = 7, x_2 = 3.162$$

Answer

6



$$x_{n+1} = \frac{x_n^2 + 3}{5} \text{ with } x_0 = 1.$$

Amy writes

$$x_1 = 1^2 + \frac{3}{5} = 1.6$$

Explain her mistake. Find x_1 and x_2 .

the whole top is divided by 5: $\frac{1+3}{5}$

$$x_2 = \frac{0.64 + 3}{5}$$

$$x_1 = 0.8, x_2 = 0.728$$

Answer

7



A number plus its cube is 20.

Show that the number satisfies

$$x = \sqrt[3]{20 - x}, \text{ then use } x_{n+1} = \sqrt[3]{20 - x_n}$$

with $x_0 = 2$ to find it to 2

decimal places.

$$x + x^3 = 20, x^3 = 20 - x$$

$$2.6207, 2.5903, 2.5918$$

$$2.59$$

Answer

8



Leo uses $x_{n+1} = x_n^2 - 2$ with $x_0 = 3$ to try to solve $x^2 - x - 2 = 0$

Work out three values and explain why this does not find a solution.

$$7, 47, 2207$$

solutions 2 and -1: it moves away

the values grow, never settle

Reason