Solutions

2.1

- $x_1 = \sqrt{1+2} = \sqrt{3} = \mathbf{1.73205}$

2.2

- $x = 1$: $1 + 1 - 4 = -2$; $x = 2$: $8 + 2 - 4 = 6$
- the sign changes from negative to positive, so there is a root between 1 and 2

2.3

- $x^2 + 2 = 5x$, then divide by 5: $x = \dfrac{x^2+2}{5}$

2.4

- $x_1 = \dfrac{0+2}{5} = 0.4$, $x_2 = \dfrac{0.16+2}{5} = 0.432$
- $x_3 = \dfrac{0.432^2+2}{5} = \mathbf{0.4373}$

2.5

- $x_1 = 3 - \frac{1}{3} = 2.66667$
- $x_2 = 3 - \dfrac{1}{2.66667} = \mathbf{2.625}$

3.1

- she used x_0 every time; each step must use the **previous** iterate: $x_2 = \sqrt{x_1+2} = \sqrt{3.73205}$

3.2

- $x^3 = 3x + 5$, then take the cube root: $x = \sqrt[3]{3x+5}$

3.3

- $x_1 = \sqrt[3]{11} = 2.22398$
- $x_2 = \sqrt[3]{11.67194} = 2.26837$
- $x_3 = \sqrt[3]{11.80512} = \mathbf{2.2770}$

3.4

- $x = 2.275$: $2.275^3 - 3 \times 2.275 - 5 = -0.0505\ldots$; $x = 2.285$: $2.285^3 - 3 \times 2.285 - 5 = 0.0756\ldots$
- the sign changes between 2.275 and 2.285, so the root rounds to **2.28**

3.5

- $f(x) = x^3 + 4x - 1$: $f(0) = -1$ and $f(1) = 4$, a change of sign
- $x_1 = \dfrac{1 - 0.125}{4} = 0.21875$, $x_2 = \dfrac{1 - 0.21875^3}{4} = 0.24738$
- $x_3 = 0.24622$, $x_4 = 0.24627$, $x_5 = 0.24627$
- $\mathbf{x = 0.246}$ (3 d.p.)