**1** Show in each case that there is a root of the equation $f(x) = 0$ in the given interval.

| | | | |
|---|---|---|---|
| **a** $f(x) = x^3 + 3x - 7$ | $(1, 2)$ | **b** $f(x) = 5\cos x - 3x$ | $(0.5, 1)$ |
| **c** $f(x) = 2e^x + x + 5$ | $(-6, -5)$ | **d** $f(x) = x^4 - 5x^2 + 1$ | $(2.1, 2.2)$ |
| **e** $f(x) = \ln(4x - 1) + x^2$ | $(0.4, 0.5)$ | **f** $f(x) = e^{-x} - 9\cos 4x$ | $(10, 11)$ |

2.

$f(x) = 2^x - x - 3$

The equation $f(x) = 0$ has a root $x$ in the interval $[2, 3]$.

3.

**1** Use interval bisection to find the positive square root of $x^2 - 7 = 0$, correct to one decimal place.

**2** **a** Show that one root of the equation $x^3 - 7x + 2 = 0$ lies in the interval $[2, 3]$.

**b** Use interval bisection to find the root correct to two decimal places.

**3** **a** Show that the largest positive root of the equation $0 = x^3 + 2x^2 - 8x - 3$ lies in the interval $[2, 3]$.

**b** Use interval bisection to find this root correct to one decimal place.

**4** **a** Show that the equation $f(x) = 1 - 2\sin x$ has one root which lies in the interval $[0.5, 0.8]$.

**b** Use interval bisection four times to find this root. Give your answer correct to one decimal place.

**5** **a** Show that the equation $0 = \frac{x}{2} - \frac{1}{x}, x > 0$, has a root in the interval $[1, 2]$.

**b** Obtain the root, using interval bisection three times. Give your answer to two significant figures.

**6** $f(x) = 6x - 3^x$

The equation $f(x) = 0$ has a root between $x = 2$ and $x = 3$. Starting with the interval $[2, 3]$ use interval bisection three times to give an approximation to this root.