

1.3 Answers (1.2 Exercise)

Answer 1

(i) $f(2.15) = + 0.071\,431$

(ii) $f(2.25) = - 0.032\,857$

As $f(2.15)$ is +ve and $f(2.25)$ is -ve (and the curves are smooth and continuous) there must be a value of x between 2.15 and 2.25 where the equation equals zero exactly.

As all values of x between 2.15 and 2.25 round off to 2.2, the solution to 1 decimal place is 2.2 $\square$

Answer 2

(i) $f(2.215) = + 0.004\,326$

(ii) $f(2.225) = - 0.006\,224$

(iii) $f(2.235) = - 0.016\,833$

$\therefore$ Solution to 2 decimal places is 2.22

Answer 3

(i) $f(2.2175) = + 0.001\,694$

(ii) $f(2.2185) = + 0.000\,640$

(iii) $f(2.2195) = - 0.000\,414$

$\therefore$ Solution to 3 decimal places is 2.219

Answer 4

Here are the likely numbers to be tried...

$f(2.21855) = + 0.000\,587$

$f(2.21865) = + 0.000\,482$

$f(2.21875) = + 0.000\,377$

$f(2.21885) = + 0.000\,271$

$f(2.21895) = + 0.000\,166$

$f(2.21905) = + 0.000\,060$

$f(2.21915) = - 0.000\,045$

$f(2.21925) = - 0.000\,151$

$f(2.21935) = - 0.000\,256$

$f(2.21945) = - 0.000\,362$

$\therefore$ Solution to 4 decimal places is 2.2191

Out of Interest 2.219 107 158 915 2 is the solution to 13 decimal places

Answer 5

(a) $g(2.05) = -0.634\,875$

$g(2.15) = +0.188\,375$

As $g(2.05)$ is -ve and $g(2.15)$ is +ve (and the curves are smooth and continuous) there must be a value of x between 2.05 and 2.15 for which $g(x) = 0$ exactly.

As all values of x between 2.05 and 2.15 round off to 2.1, the solution to 1 decimal place is 2.1 $\square$

(b) $g(2.125) = -0.029\,297$

$g(2.135) = +0.056\,810$

$\therefore$ Solution to 2 decimal places is 2.13

Answer 6

(i) $h(0.5) = +0.125$

(ii) $h(3.5) = +30.875$

(iii) There is no change of sign.

(iv) $h(1.5) = -0.625$

(v) There are at least two roots in the interval between 0.5 and 3.5**(vi)**

$h(-2.215) = -0.007\,288$

$h(-2.205) = +0.099\,235$

$\therefore$ Solution to 2 decimal places is -2.21

$h(0.535) = +0.013\,130$

$h(0.545) = -0.018\,121$

$\therefore$ Solution to 2 decimal places is 0.54

$h(0.5385) = +0.000\,216$

$h(0.5395) = -0.000\,973$

$\therefore$ Solution to 3 decimal places is 0.538

$h(1.675) = -0.000\,578$

$h(1.685) = +0.044\,094$

$\therefore$ Solution to 2 decimal places is 1.68