



a Show that $x^3 = 5x + 1$ can be written as $x = \sqrt{5 + \frac{1}{x}}$ $\div x: x^2 = 5 + \frac{1}{x}$ divide by x, then square root	b $x_1 = 2$. Use $x_{n+1} = \sqrt{5 + \frac{1}{x_n}}$ to find x_3 to 3 decimal places 2.329 a fraction inside a root	c $x_2 = 5$ and $x_{n+1} = \sqrt{2x_n + 7}$. Find x_1 $x_1 = 9$ working back one step	d Which cubic equation does $x_{n+1} = 3 - \frac{2}{x_n^2}$ solve? $x^3 - 3x^2 + 2 = 0$ the equation an iteration solves
e Does $5x^2 - 5x + 1 = 0$ have a root between 0 and 1? <i>yes, two</i> <i>it is negative at 0.5</i> no sign change, but roots	f Does $\frac{1}{x-2} = 0$ have a root between 1 and 3? <i>no: it jumps at $x = 2$</i> a sign change, but no root	g $x_1 = 1$ and $x_{n+1} = 1 + \frac{1}{x_n}$. Find x_5 as a fraction $\frac{8}{5}$ exact steps with fractions	h Show that $x^3 = 6x - 2$ has a root of 2.26 to 3 significant figures <i>- at 2.255, + at 2.265</i> bounds to 3 sf: make it equal 0
i $x_{n+1} = \frac{x_n^2 + a}{5}$ settles at 2. Find a . $a = 6$ a constant from the limit	j $x_1 = 2$ and $x_{n+1} = \frac{x_n^3 + 2}{6}$. Which root of $x^3 - 6x + 2 = 0$ does it reach, to 2 dp? 0.34 it can reach a different root	k $x_1 = 3$ and $x_{n+1} = \frac{x_n^3 + 2}{6}$. What happens to x_n ? <i>it grows without limit</i> an iteration that diverges	l $x_1 = 1$ and $x_{n+1} = 1 + \frac{1}{x_n}$. Find the exact value x_n settles at $\frac{1 + \sqrt{5}}{2}$ an exact limit in surd form

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