

The Method of Iteration to Solve Equations

1.

- a Show that the equation $x^6 - 5x + 3 = 0$ has a root between $x = 1$ and $x = 1.5$.
 - b Use the iteration formula $x_{n+1} = \sqrt[5]{5 - \frac{3}{x_n}}$ to find an approximation for the root of the equation $x^6 - 5x + 3 = 0$, giving your answer to 2 decimal places.
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2.

The equation $3x - 2x^3 + 5 = 0$ has one solution.



- a) Show that this solution lies in the interval $1.5 < x < 2$.
- b) Show that $3x - 2x^3 + 5 = 0$ can be written as:

$$x = \sqrt[3]{\frac{3x+5}{2}}$$

- c) Use the iteration $x_{n+1} = \sqrt[3]{\frac{3x_n+5}{2}}$ to find the solution to $3x - 2x^3 + 5 = 0$ to 5 d.p.
Use a starting value of $x_0 = 2$.
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3.

- a Show that the equation $x^2 - 3x - 5 = 0$ can be rewritten in the form $x = \sqrt{3x+5}$
 - b Using $x = \sqrt{3x+5}$ with $x_0 = 4$, use iteration to find one root of the equation $x^2 - 3x - 5 = 0$, giving your answer correct to 5 d.p.
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4.

- Use iteration to find one root of each of these equations, giving your answers correct to 5 d.p.
- a $x^2 - 4x - 4 = 0$, use $x_0 = 5$
 - b $x^2 - 6x - 8 = 0$, use $x_0 = 7$
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