Solve equations numerically : Change of sign
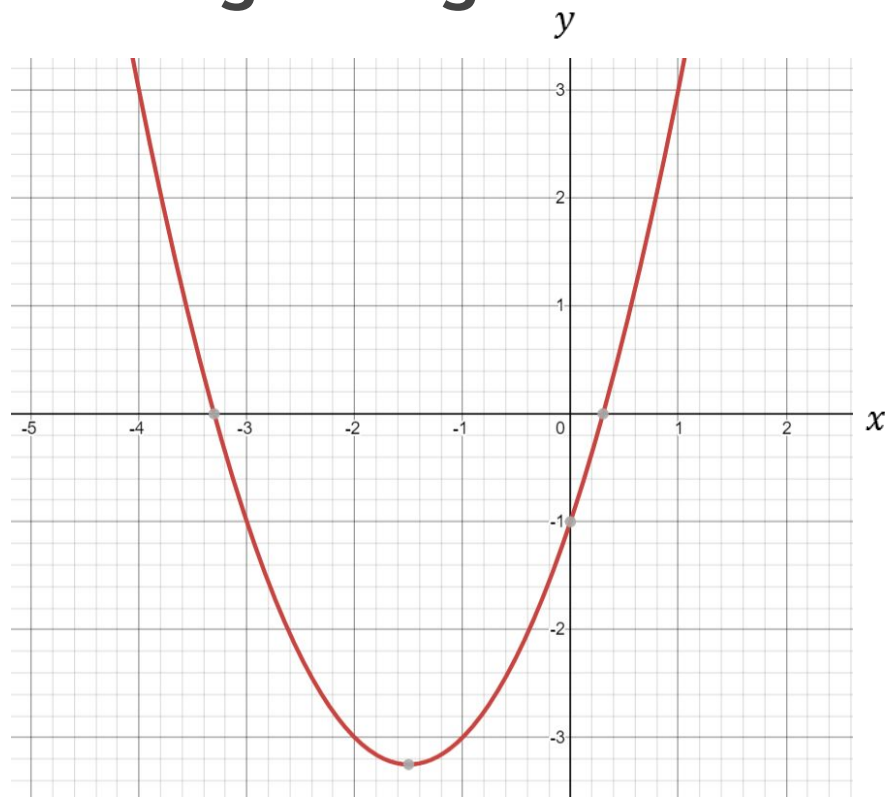
Maths

Mr Clasper

Solve equations numerically : Change of sign

1. Opposite is the graph of

$$y = x^2 + 3x - 1$$

a) Explain how you know from the graph that there is a solution to the equation $x^2 + 3x - 1 = 0$ between $x = 0$ and $x = 1$

b) State the two other integer values of x which the second solution lies between.

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2. a) Show that there is a solution to the equation $x^3 - 3x - 1 = 0$ between $x = 1$ and $x = 2$

b) Show that there is a solution to the equation $x^3 - 3x = 1$ between $x = 1$ and $x = 2$

c) What do you notice about your answers in part (a) and part (b)?

3. By looking for a change of sign (or otherwise) show that there is a solution to each equation between the two values shown.

a) $x^2 + x - 11 = 0$ between $x = 2$ and $x = 3$

b) $x^2 + x - 11 = 0$ between $x = 2.8$ and $x = 2.9$
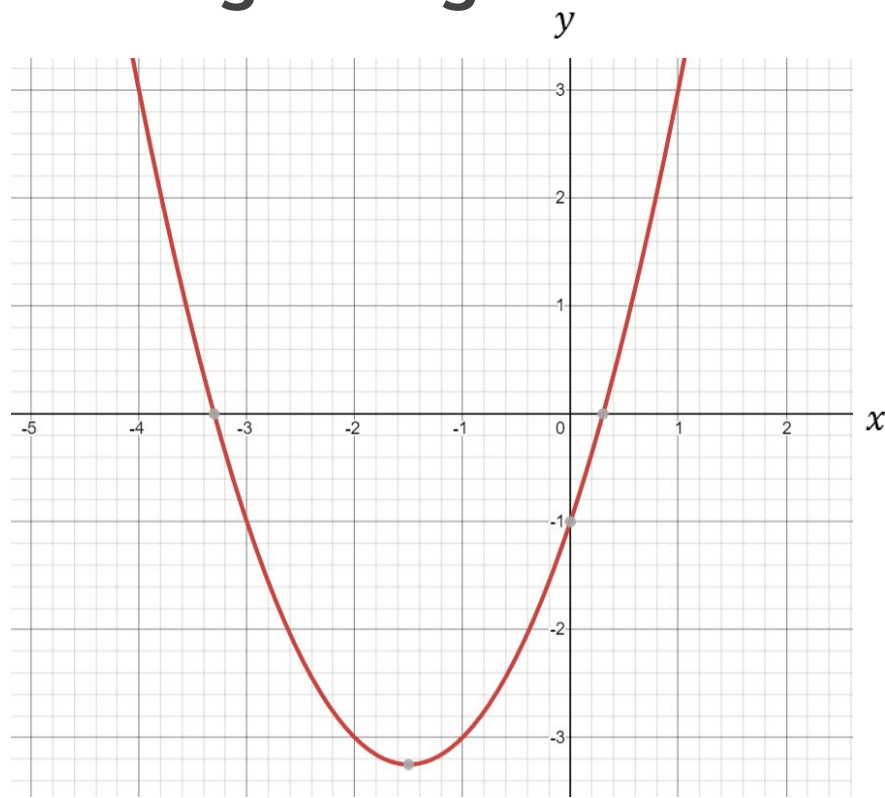
Answers

Solve equations numerically : Change of sign

1. Opposite is the graph of

$$y = x^2 + 3x - 1$$

a) Explain how you know from the graph that there is a solution to the equation $x^2 + 3x - 1 = 0$ between $x = 0$ and $x = 1$ The graph cuts the x-axis between $x = 0$ and $x = 1$

b) State the two other integer values of x which the second solution lies between. $x = -3$ and $x = -4$

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Solve equations numerically : Change of sign

2. a) Show that there is a solution to the equation $x^3 - 3x - 1 = 0$ between $x = 1$ and $x = 2$

When $x = 1$, $x^3 - 3x - 1 = -3$ but when $x = 2$, $x^3 - 3x - 1 = 1$
Sign change.

b) Show that there is a solution to the equation $x^3 - 3x = 1$ between $x = 1$ and $x = 2$

When $x = 1$, $x^3 - 3x$ is less than 1 but when $x = 2$, $x^3 - 3x$ is greater than 1. So solution between.

c) What do you notice about your answers in part (a) and part (b)?

Solving same equation

3. By looking for a change of sign (or otherwise) show that there is a solution to each equation between the two values shown.

a) $x^2 + x - 11 = 0$ between $x = 2$ and $x = 3$ $x = 2$ (-5) and $x = 3$ (1)

b) $x^2 + x - 11 = 0$ between $x = 2.8$ and $x = 2.9$

$x = 2.8$ (-0.36) and $x = 2.9$ (0.31)