

Finding roots of an equation between 2 values

1. Show that the equation $x^3 - 14 = 0$ has a solution between $x = 2$ and $x = 3$
2. Show that the equation $x^3 + 6x^2 - 9x + 2 = 0$ has a solution between $x = 0$ and $x = 0.5$
3. Show that the equation $1 + x^2 - x^3 = 0$ has a solution between $x = 1$ and $x = 2$
4. Show that the equation $x^3 - x = 0$ has a solution between $x = 2$ and $x = 2.5$
5. Show that the equation $x^2 - 6x - 3 = 0$ has a root between $x = 6.4$ and $x = 6.5$
6. Show that the equation $x^2 - 2x - 5 = 0$ has a root between $x = 3.4$ and $x = 3.5$
7. Show that the equation $x^2 + 4x - 3 = 0$ has a root between $x = 0.64$ and $x = 0.65$
8. Show that the equation $x^3 - 10x - 25 = 0$ has a solution between $x = 9$ and $x = 10$
9. a. Complete the table for $y = x^2 - 5x + 3$

- b. Between which two consecutive integers is there a solution to the equation $x^2 - 5x + 3 = 0$? Give a reason for your answer.
10. a. Show that the equation $x^2 - 3x - 7 = 0$ has a solution between $x = 4$ and $x = 5$.
b. Use trial and improvement to find the value of this root to one decimal place. (hint: try a value of x between 4 and 5 - use this to narrow down the possible values of x that the root can be.)
11. a. Show that the equation $x^3 - 2x - 3 = 0$ has a solution between $x = 1$ and $x = 2$.
b. Use trial and improvement to find the value of this root to one decimal place.
12. a. How many solutions does the equation $x^2 + 3x - 8 = 0$ have? Give reasons for your answer.
b. Use trial and improvement to find the value of all the roots of this equation to one decimal place.
13. Show that the equation $\frac{1}{x} = 0$ has a solution between $x = -1$ and $x = 0.5$
Now draw the graph of $y = \frac{1}{x}$. What happens between $x = -1$ and $x = 0.5$? Does that affect your answer? Discuss with a partner.

Answers:

1. $f(2) = -6$ and $f(3) = 13$
2. $f(0) = 2$ and $f(0.5) = -0.875$
3. $f(1) = 1$ and $f(2) = -3$
4. $f(1) = -1$ and $f(1.5) = 0.875$
5. $f(6.4) = -0.44$ and $f(6.5) = 0.25$
6. $f(3.4) = -0.24$ and $f(3.5) = 0.25$
7. $f(0.64) = -0.0304$ and $f(0.65) = 0.0225$
8. $f(4) = -6$ and $f(5) = 45$
9. $y = x^2 - 5x + 3$ - between $x = 0$ and 1 , $x = 4$ and

x	0	1	2	3	4	5
y	3	-1	-3	-3	-1	3

10. $f(4) = -3$ and $f(5) = 3$
 $x = 4.5$
11. $x^3 - 2x - 3 = 0$
 $f(1) = -4$ and $f(2) = 1$
 $x = 1.9$
12. $y = x^2 + 3x - 8$
2 solutions as discriminant greater than 0
 $X = -4.7$ and 1.7
13. $f(-1) = -1$ and $f(0.5) = 2$, suggests there is a solution.
However, the graph does not cross the axes so this is an example where the method of finding a sign change does not work.