

Multiple Solutions

T1

1. For each of the following equalities and inequalities, find two values for x that make the statement true.

a. $x^2 = 121$

11 -11 ✓

b. $x^2 = x$

1 0 ✓

c. $x^2 < x$

$\frac{1}{4}$ $\frac{1}{3}$ ✓

d. $(x-1)(5x^4 - 7x^3 + x) = 0$

$\frac{1}{5}$ $\frac{1}{2}$
1

0 1 ✓

e. $1776x + 1066 \geq 365$
 $-1066 - 1066$

1 2 ✓

f. $x^2 > x^3$

-1 -2 ✓

g. $|x| = x$

1 2 ✓ 7

2. Some of the equations and inequalities on the page opposite have exactly two solutions; others have more than two solutions.

- a. Write down two equations or inequalities that have exactly two solutions.
Explain your answer.

$$x^2 = 121 \quad \checkmark \quad x^2 = x \quad \checkmark \quad x = +x \text{ or } -x$$

$$x = +11 \text{ or } -11$$

These are quadratic equations and so have 2 solutions ✓

- b. Write down one equation or inequality that has more than two solutions, but not infinitely many solutions. How many solutions does it have?

$$(x-1)(5x^4 - 7x^3 + x) = 0 \quad \checkmark$$

This has 5 solutions ✓

- c. Write down two equations or inequalities that have an infinite number of solutions.

$$1776x + 1066 \geq 365 \quad \checkmark \quad |x| = x \quad \checkmark$$

1. For each of the following equalities and inequalities, find two values for x that make the statement true.

a. $x^2 = 121$

11

-11



b. $x^2 = x$

1

0



c. $x^2 < x$

$\frac{1}{2}$

$\frac{1}{4}$



d. $(x-1)(5x^4 - 7x^3 + x) = 0$

1

0



e. $1776x + 1066 \geq 365$

$1776x \geq -701$

1

2



f. $x^2 > x^3$

$\frac{1}{2}$

$\frac{1}{4}$



g. $|x| = x$

2

4



7.

2. Some of the equations and inequalities on the page opposite have exactly two solutions; others have more than two solutions.

- a. Write down two equations or inequalities that have exactly two solutions.
Explain your answer.

$$x^2 = 225 \checkmark \quad x^4 = 16 \checkmark$$

These 2 equations are powers to an even degree, meaning that there are always 2 solutions, one positive & one negative. \checkmark

- b. Write down one equation or inequality that has more than two solutions, but not infinitely many solutions. How many solutions does it have?

$$(x^3 + 6x^2 + 11x + 6) \wedge$$

It has 3 solutions ($x = -1, -2, -3$) 0

- c. Write down two equations or inequalities that have an infinite number of solutions.

$$x = x$$

$$x + 1 = x + 1$$

0

Multiple Solutions

T3

1. For each of the following equalities and inequalities, find two values for x that make the statement true.

a. $x^2 = 121$ $x = \pm\sqrt{121}$
 $x = \pm 11$

11

-11 ✓

b. $x^2 = x$ $x^2 - x = 0$
 $x(x-1) = 0$
 $x = 0$ or 1

+10

1 ✓

c. $x^2 < x$ $x^2 - x < 0$
 $x(x-1) < 0$
 $x > 0$ or $x < 1$
 $0 < x < 1$

$\frac{1}{2}$

$\frac{1}{4}$ ✓

d. $(x-1)(5x^4 - 7x^3 + x) = 0$
 $(x-1)(x)(5x^3 - 7x^2 + 1) = 0$
 $(x-1)(x)(x)(5x-7)+1 = 0$
 $x = 1$ or 0

1

0 ✓

$x(5x^4 - 7x^3 + x) - 1(5x^4 - 7x^3 + x)$
 $5x^5 - 7x^4 + x^2 - 5x^4 + 7x^3 - x$
 $5x^5 - 12x^4 + 7x^3 + x^2 - x$
 $(x)(5x^4 - 12x^3 + 7x^2 + x - 1)$

e. $1776x + 1066 \geq 365$
 $1776x \geq -701$
 1776
 $x \geq -0.39 + 7012 \dots$

5

6 ✓

f. $x^2 > x^3$
 $x^2 - x^3 > 0$
 $x^2(1-x) > 0$
 $x > 0$ $x > 1$

2

3 ✗

g. $|x| = x$ $x = +$

10

11 ✓

6

2. Some of the equations and inequalities on the page opposite have exactly two solutions; others have more than two solutions.

a. Write down two equations or inequalities that have exactly two solutions.

Explain your answer.

$\frac{6}{-2 \times -3}$
 $\frac{-5}{-1 \times 5}$

$$x^2 - 5x + 6 = 0 \Rightarrow (x-2)(x-3) = 0 \Rightarrow x = 2 \text{ OR } 3$$

$\frac{x+5}{2 \times 1}$

$$2x^2 + 11x + 5 = 0 \Rightarrow (x+5)(2x+1) = 0 \Rightarrow x = -5 \text{ OR } -\frac{1}{2}$$

1

b. Write down one equation or inequality that has more than two solutions, but not infinitely many solutions. How many solutions does it have?

$$(x+5)(x-3)(x+1) = 0 \Rightarrow x^2 + 2x - 15 (x+1) = 0 \Rightarrow x(x^2 + 2x - 15) + 1(x^2 + 2x - 15) = 0$$

$$x^3 + 2x^2 - 15x + x^2 + 2x - 15 = 0 \Rightarrow x^3 + 3x^2 - 13x - 15 = 0$$

$$x^3 + 3x^2 - 13x - 15 = 0 \Rightarrow (x+5)(x-3)(x+1) = 0 \Rightarrow x = -5 \text{ OR } 3 \text{ OR } -1 \quad 3 \text{ solutions}$$

1

c. Write down two equations or inequalities that have an infinite number of solutions.

$$3x > x - 60 \Rightarrow 2x > -60 \Rightarrow x > -30$$

$$|x+5| > 2 \Rightarrow x+5 > 2 \Rightarrow x > -3$$

$$\downarrow \qquad \qquad \qquad \searrow$$

$$x+5 < -2 \Rightarrow x < -7 \qquad \qquad \qquad x > -3 \text{ OR } x < -7$$

1

Multiple Solutions

T4

1. For each of the following equalities and inequalities, find two values for x that make the statement true.

a. $x^2 = 121$

$x = 11$

$x = -11$ ✓

b. $x^2 = x$

$x = 1$

$x = 0$ ✓

c. $x^2 < x$

$x = \frac{1}{2}$

$x = \frac{1}{4}$ ✓

d. $(x-1)(5x^4 - 7x^3 + x) = 0$

$x = 1$

$x = 0$ ✓

$5x^5 - 7x^4 + x^2 - 5x^4 + 7x^3 - x = 0$

$5x^5 + 12x^4 + 7x^3 + x^2 - x = 0$

e. $1776x + 1066 \geq 365$

$x = 1$

$x = 2$ ✓

$1776x \geq -701$

$x \geq 0.3947072072$

f. $x^2 > x^3$

$x = -1$

$x = -2$ ✓

g. $|x| = x$

$x = 1$

$x = 2$ ✓

7

2. Some of the equations and inequalities on the page opposite have exactly two solutions; others have more than two solutions.

- a. Write down two equations or inequalities that have exactly two solutions.
Explain your answer.

$a x^2 = 121$ ✓ $b x^2 = x$ ✓ For a, it is because a

positive number only has 2 square roots - one positive and one negative

For b, it is because any number ^{times} x one, including one, will equal

itself $|x| \cdot 1 = |x|$ (itself) Also anything multiplied by zero, is zero including zero. $0 \cdot 0, 0^2 = 0$ (itself)

- b. Write down one equation or inequality that has more than two solutions, but not infinitely many solutions. How many solutions does it have?

$(x-1)(5x^4 - 7x^3 + x) = 0$ ✓ has 5 solutions ✓ $x^4 \rightarrow 4$
 $x \rightarrow 1$ $4+1=5$

- c. Write down two equations or inequalities that have an infinite number of solutions.

$x^2 < x$ ✓ $1776x + 1066 \geq 365$ ✓

Multiple Solutions

T5

1. For each of the following equalities and inequalities, find two values for x that make the statement true.

a. $x^2 = 121$

11

-11

✓

b. $x^2 = x$

1

0

✓

c. $x^2 < x$

$\frac{1}{2}$

$\frac{1}{4}$

✓

d. $(x-1)(5x^4 - 7x^3 + x) = 0$

1 ✓

1

e. $1776x + 1066 \geq 365$

-0.36

10

✓

$1776x \geq -703$

$x \geq -0.36$

f. $x^2 > x^3$ anything negative

-3

-8

✓

g. $|x| = x$ anything positive

10

7

✓

6

2. Some of the equations and inequalities on the page opposite have exactly two solutions; others have more than two solutions.

a. Write down two equations or inequalities that have exactly two solutions.

Explain your answer.

$x^2 = 64$ ✓ and $x^2 = x$ ✓. $x^2 = 64$ has only 2 solutions: $x = 8$ or -8

because you square root both sides. $\sqrt{64}$ can have both positive & negative solution.

$x^2 = x$ has only 2 solutions: $1 + 0$. Nothing negative can work and anything

greater than 1 can't work. This only works with numbers that multiply w/ themselves and equal themselves. The only possibilities are $1 + 0$.

b. Write down one equation or inequality that has more than two solutions, but not infinitely many solutions. How many solutions does it have?

$(x-1)(5x^4 - 7x^3 + x) = 0$ has 5 solutions

c. Write down two equations or inequalities that have an infinite number of solutions.

$|x| = x$ and $x^4 > x^5$. $|x| = x$ has an infinite # of positive solutions +

$x^4 > x^5$ has an infinite # of negative solutions. ✓