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

e. $1776x + 1066 \geq 365$ 1 2

f. $x^2 > x^3$ -1 -2

g. $|x| = x$ 1 2

T1

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.

$x^2 = 121$ $x^2 = x$ $x = +x$ or $-x$

$x = +11$ 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?

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

This has 5 solutions

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

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

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. $1776x + 1066 \geq 365$ 1 2

$1776x \geq -701$

f. $x^2 > x^3$ $\frac{1}{2}$ $\frac{1}{4}$

g. $|x| = x$ 2 4

T2

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.

$x^2 = 225$ $x^4 = 16$

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

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

$x^3 + 6x^2 + 11x + 6$

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

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

$x = x$ $x + 1 = x + 1$

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 — 0 — 1

c. $x^2 < x$ $x^2 - x < 0$ $x(x-1) < 0$ $x > 0$ or $x < 1$ $0 < x < 1$ — $\frac{1}{2}$ — $\frac{1}{9}$

d. $(x-1)(5x^4 - 7x^3 + x) = 0$ $(x-1)(x)(5x^3 - 7x^2 + 1) = 0$ $(x-1)(x)(x^2(5x-7)+1) = 0$ $x = 1$ 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. $1776x + 1066 \geq 365$ $1776x \geq -701$ $\frac{1776}{1776}$ $x \geq -0.3947072\ldots$ — 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

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.

$x^2 - 5x + 6 = 0 \Rightarrow (x-2)(x-3) = 0 \Rightarrow x = 2$ or 3

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

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

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

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

$x^3 + 3x^2 - 13x - 15 = 0 \Rightarrow (x+5)(x-3)(x+1) = 0 \Rightarrow x = -5$ or 3 or -1 3 solutions

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

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

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

$x+5 < -2 \Rightarrow x < -7$ $\Longrightarrow$ $x > -3$ or $x < -7$

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. $x^2 < x$ $X = 1/2$ $X = 1/4$

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. $1776x + 1066 \geq 365$ $X = 1$ $X = 2$

$1776x \geq -701$

$x \geq 0.3947072\overline{072}$

f. $x^2 > x^3$ $X = -1$ $X = -2$

g. $|x| = x$ $X = 1$ $X = 2$

T4

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 1×1 or $1^2 = 1$ (itself). Also anything multiplied by zero, is zero including zero. 0×0, $0^2 = 0$ (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 $x^4 \to 4$, $x \to 1$, $4+1=5$

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

$x^2 < x$, $176x + 1066 \geq 365$

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 —

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

T5

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.