- Math Support Center now open

- MATH 1012 — No previous calculus
  MATH 1013 — regular
  MATH 1023 — (honors)

WeBWork Assign 1

\# 6 Solve $x^2 - 2x - 8 = 0$.

Solution Factor $x^2 - 2x - 8 = (x+2)(x-4)$

If product equals 0, then at least one factor is zero. So

$$x+2=0 \quad \underline{\text{OR}} \quad x-4=0$$

$$x=-2 \qquad\qquad x=4$$

Solution set is $\{-2, 4\}$

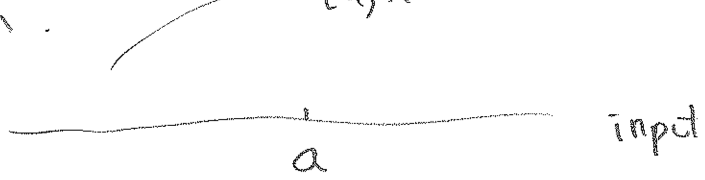
\# 7 Complete square of $x^2 - 2x + 192$ to $(x+A)^2 + B$

$$(x^2 - 2x + 192) = \overbrace{(x^2 - 2x + 1)}^{\text{is a square}} + 191$$

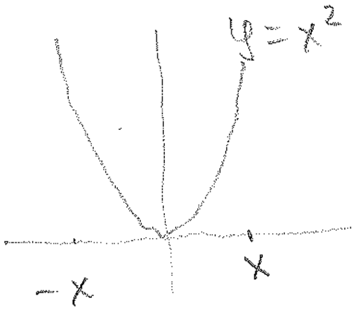
$$= (x-1)^2 + 191.$$

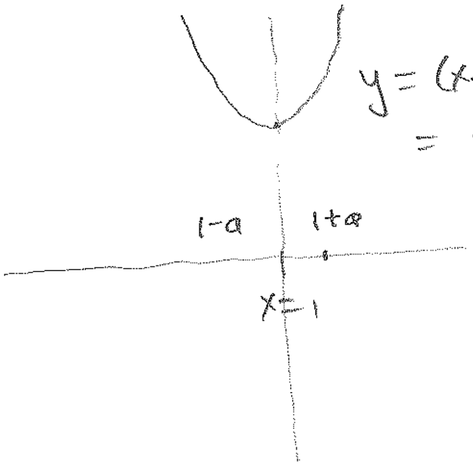
Useful. $y = f(x) = x^2 - 2x + 192$ function
inputs are numbers
outputs

Can graph function.



To graph $x^2-2x+192 = (x-1)^2+191 = f(x)$





12 Inequality problem.

$$\frac{(x+1)}{12} \geq \frac{(x+1)}{16} + \frac{4}{48}$$

$$48\left((x+1)\left(\frac{1}{12}-\frac{1}{16}\right) \geq \frac{4}{48} \right).$$

$$(x+1)(4-3) \geq 4$$

$$x+1 \geq 4$$

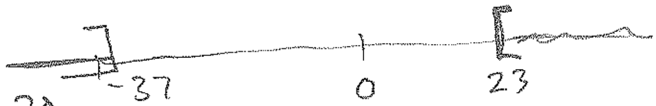
$$x \geq 3 \qquad [3,\infty)$$

13 Solve $|2x-10|+1=1.$

$$|2x-10| = 0 . \iff 2x-10=0$$

$$x=5$$

15 Solve $\left|\frac{x+7}{5}\right| \geq 6.$



$|x+7| \geq 6\cdot 5 = 30.$

$|x+7| \geq 30.$ $\quad x+7 \geq 30$ leads to $x \geq 23$

$-(x+7) \geq 30 \quad -x \geq 37 \quad x \leq -37.$

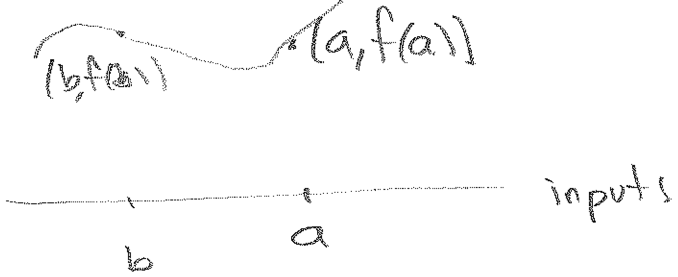
(-Inf, -37] U [23, Inf).

↑
union.

Set D $\xrightarrow{f}$ Set C

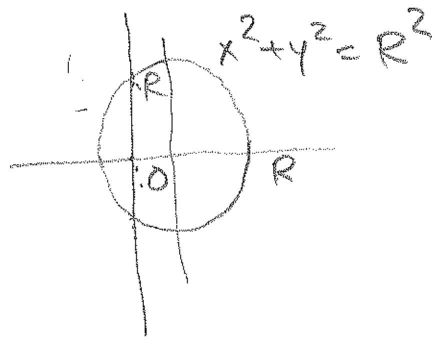
inputs outputs.

When both input and output sets are real numbers sets we can graph function



"Just graph". Example.

$$\{ (x,y) \mid x^2+y^2 = R^2 \}$$



Solve for y in terms of x

$$y^2 = R^2 - x^2, \quad y = \pm\sqrt{R^2-x^2}$$

For <u>Function</u> only <u>one output</u> to an input.

$y = \pm\sqrt{R^2-x^2}$ NOT a function

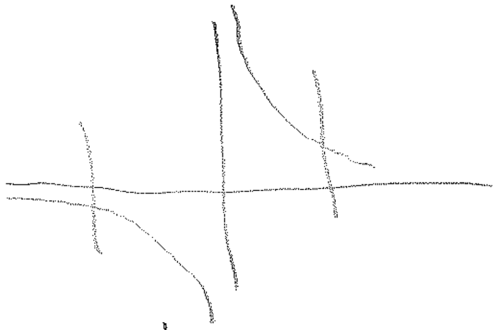
Two functions $\quad y = +\sqrt{R^2-x^2}$, 1st function

$\qquad\qquad\qquad\quad y = -\sqrt{R^2-x^2}$, 2nd function.

<u>Vertical Line Test</u>: A graph in the plane is the graph of a function precisely when a vertical line meets the graph in at MOST ONE point

Domain of $y = \sqrt{R^2-x^2}$ is $-R \le x \le R$

Same for $y = -\sqrt{R^2-x^2}$.



$\{(x,y) \mid xy=1\}$ hyperbola

Vertical line $x=0$ does NOT intersect set

$y=\frac{1}{x}$ with domain $x \neq 0$.

WeBWork Assign 2

#1 Find domain of $f(x) = (x^2-6x)^{1/4} = \sqrt{\sqrt{}}$

Since $\sqrt{}$ needs ≥ 0 inputs.

Need $x^2-6x \geq 0$.

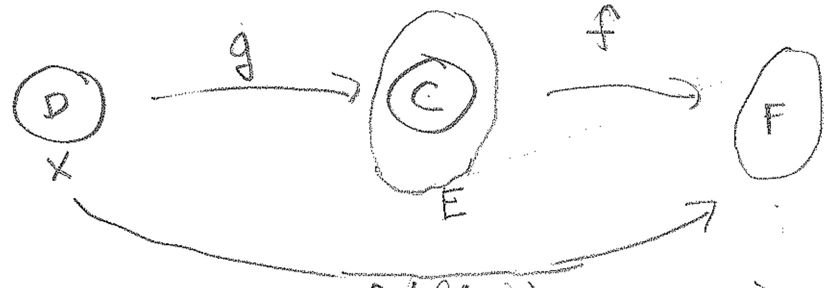
$x(x-6)$

Domain is $(-\infty, 0] \cup [6, \infty)$.

Find domain of $g(x) = (13x^2-4x)^{1/9} = (()^{1/3})^{1/3}$.

Function $()^{1/9}$ allow <u>any</u> input.

So domain is $(-\infty, \infty)$.



$f(g(x))$ composite function

#2 $f(x) = \frac{1}{x-8}$, $g(x) = \frac{x-7}{x+8}$

f domain $x \neq 8$.
g domain $x \neq -8$.

Compute composite $h(x) = f(g(x))$

Determine domain of $h = f \circ g$, and formula for h.

$$x \xrightarrow{g} \left(\frac{x-7}{x+8}\right) \xrightarrow{f} \frac{1}{\left(\frac{x-7}{x+8}\right)-8}$$

Simplify: $\frac{1}{\left(\frac{x-7}{x+8}\right)-8} = \frac{x+8}{(x-7)-8(x+8)} = \frac{x+8}{x-7-8x-64}$

$= \frac{x+8}{-7x-71}$

$h(x) = \frac{x+8}{-7x-71}$ composite function

Domain of $h = f \circ g$.

To be able to input into g
$x \neq -8$.
To be able to input into f
need $g(x) \neq 8$.

$\frac{x-7}{x+8} = 8$

$x - 7 = 8x + 64$
$-7 - 64 = 7x$
$x = \frac{-71}{7}$

$x \notin \{-8, -\frac{71}{7}\}$

Domain of $h = f \circ g$ is
$(-\infty, -\frac{71}{7}) \cup (\frac{-71}{7}, -8) \cup (-8, \infty)$.