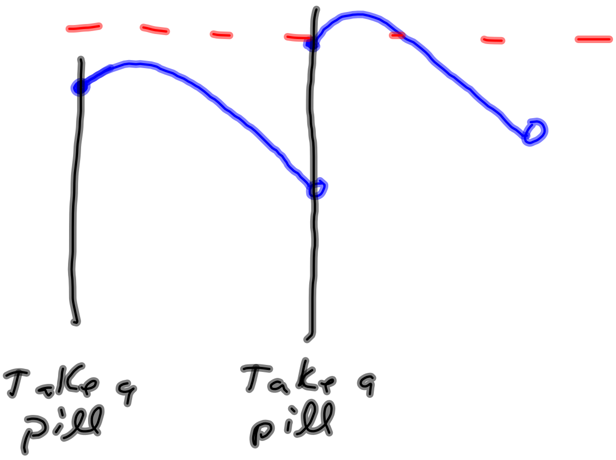
§ 2.1 assigned & 2.2

§ 2.3 #s 11-22, 39-42, 45-50, 55-66, 89, 90

Today! Piecewise-Defined functions.
More on stretches & reflections

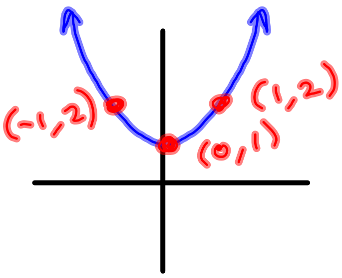
Piecewise Functions
Economic growth
when war hits.
Drugs in Bloodstream



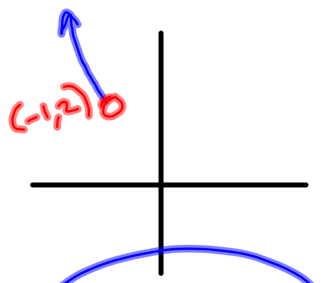
Sep 21-10:11 AM

$$f(x) = \begin{cases} x^2+1 & \text{if } x < -1 \\ -2x+4 & \text{if } x \geq -1 \end{cases}$$

Graph each piece separately
Find the suture points (in this case, $x=-1$)
Combine into one graph.

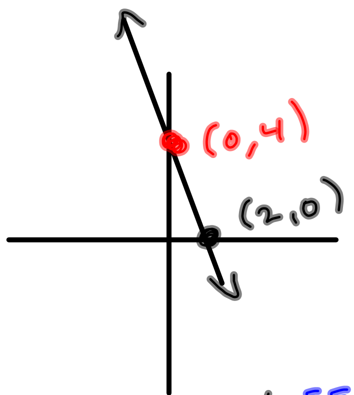


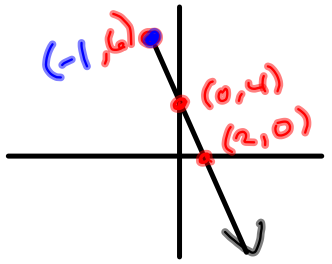
x^2+1



x^2+1
$x < -1$

$x=-1$
This piece is for $x < -1$
open dot
@ $x=-1$, $y=(-1)^2+1$
$= 2$

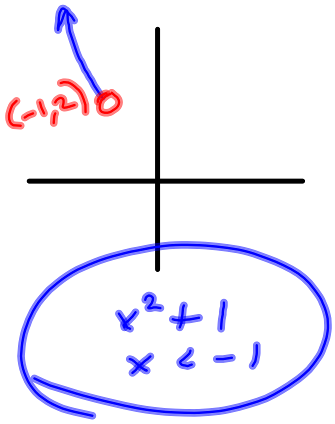


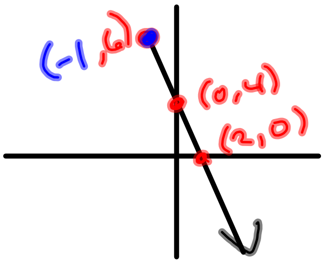


$y=-2x+4$
$x \geq -1$

$y=-2x+4 \overset{\text{SET}}{=} 0$
$-2x=-4$
$x=2 \rightsquigarrow (2,0)$
$x=-1$ is suture pt
$x \geq -1$ is region
closed dot

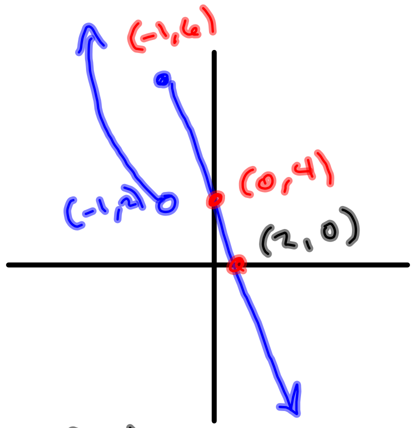
$y=-2(-1)+4$
$= 2+4 = 6 \rightsquigarrow (-1,6)$
closed dot





$y = -2x+4$
$x \geq -1$

COMBINE



$f(x)$

I think you're more ready for #53-48 in §2.1. I HATE plotting points blindly

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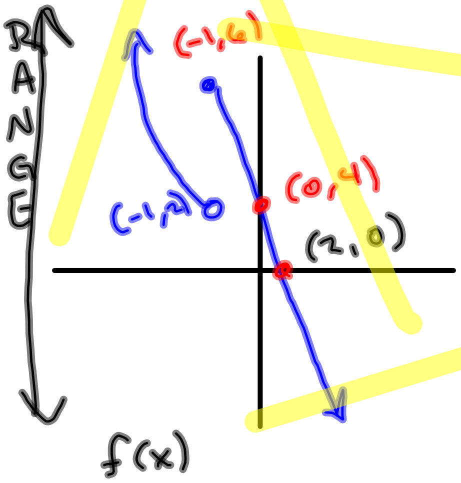
COMBINE



Domain: $(-\infty,-1) \cup [-1,\infty)$

$= (-\infty,\infty) = \mathbb{R}$

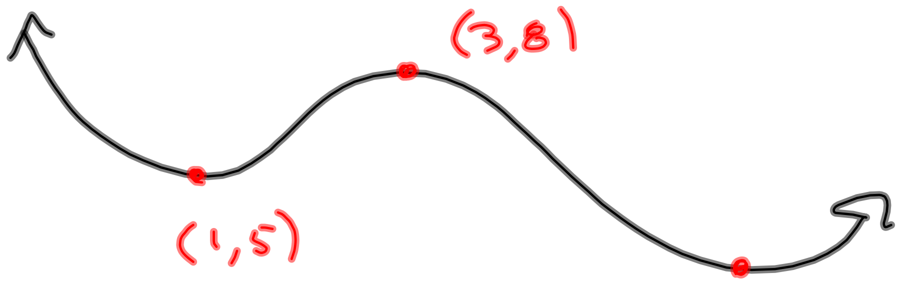
Range: $(2,\infty) \cup (-\infty,6]$

$= (-\infty,\infty)$

Domain

Things I haven't discussed:

Intervals of increase/decrease



Increasing: $x \in [1,3] \cup [7,\infty)$

Decreasing: $x \in (-\infty,1] \cup [3,7]$

This is how your book does it.

Some (most) books would say:

Inc. $x \in (1,3) \cup (7,\infty)$

Dec. $x \in (-\infty,1) \cup (3,7)$

The way your book does it, the extreme highs and lows are in the overlap between inc. & dec.

Sep 21-10:38 AM

Other Things:

Symmetry

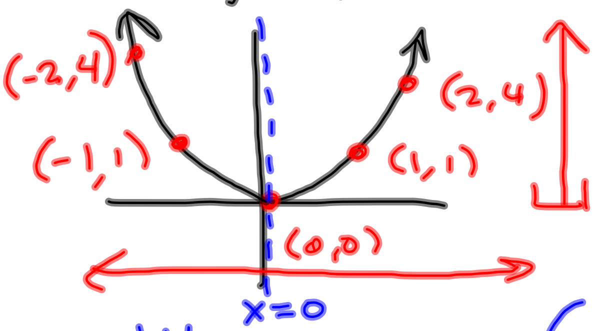
"in" the y-axis:

even function: $f(-x)=f(x)$

$f(x)= x^2$

$f(-x)= (-x)^2 = ((-1)(x))^2 = (-1)^2x^2 = x^2$

Even functions - Half the graph gives you ALL the graph.



$\mathcal{D} = (-\infty,\infty)$

$\mathcal{R} = [0,\infty)$

Inc: $x \in [0,\infty)$

Dec: $x \in (-\infty,0]$

We say $x=0$ (the y-axis) is its axis of symmetry.

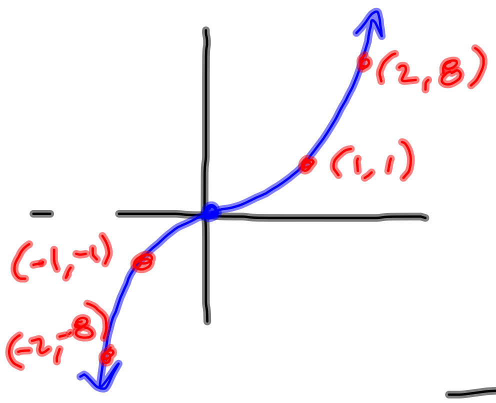
Sep 21-10:44 AM

ODD Functions:

Symmetric "in" the origin.

$f(-x) = -f(x)$

x^3

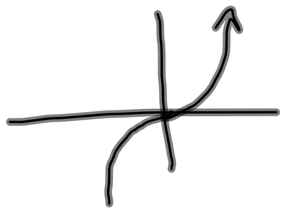


$f(-x) = (-x)^3 =$

$((-1)(x))^3 = (-1)^3 (x)^3 = -x^3$

$= -f(x)$

Inc: $x \in (-\infty, \infty)$



$\mathcal{D} = (-\infty, \infty)$

$\mathcal{R} = (-\infty, \infty)$

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$x^3 + x$ ODD

$x^3 + x^2$ Neither

$\dfrac{x^3 + x}{x^2 + 4}$ ODD

$f(-x) = \dfrac{(-x)^3 + (-x)}{(-x)^2 + 4} = \dfrac{-x^3 - x}{x^2 + 4} = \dfrac{-(x^2 + x)}{x^2 + 4}$

$= - \dfrac{x^2 + x}{x^2 + 4} = -f(x)$ ODD.

$\dfrac{x^3 + x}{x^5 + x^7} = f(x) \longrightarrow$

$f(-x) = \dfrac{-(x^3 + x)}{-(x^5 + x^7)} = \dfrac{x^3 + x}{x^5 + x^7} = f(x)$

more steps, please.