

Panel 1

Math 1303, Last time:

- Syllabus, grading, web site
<http://pirate.slu.edu/~wachsmut/>
- Dgknow install + setup
- Functions, domain, range:
- Graph of a function
- Vertical line test,
 Graphically finding
 domain + range

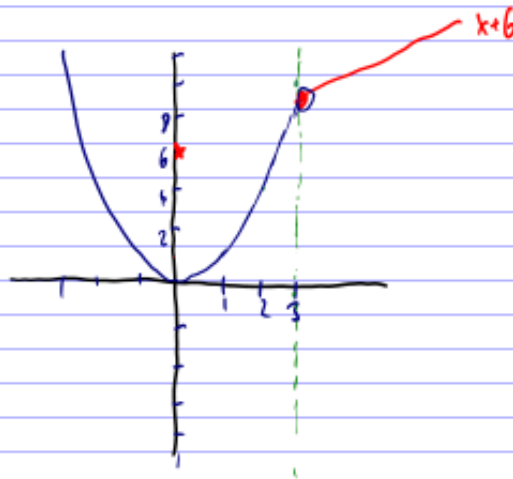
1

Panel 2

106 ~~4/137~~

$$g(x) = \begin{cases} x+6 & \text{if } x \geq 3 \\ x^2 & \text{if } x < 3 \end{cases}$$

line, slope 1, y-int 6

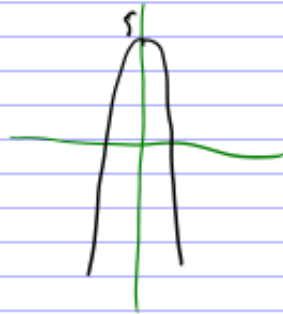


2

Panel 3

$$f(x) = 5 - 2x^2 \quad \text{come back later!}$$

$$= -2x^2 + 5$$



3

Panel 4

Quiz #1:

Name: _____

① What is the domain of the function $f(x) = \frac{3}{x^2 - 2x}$

② If $f(x) = 2x^2 + 1$, find

a) $f(-1)$

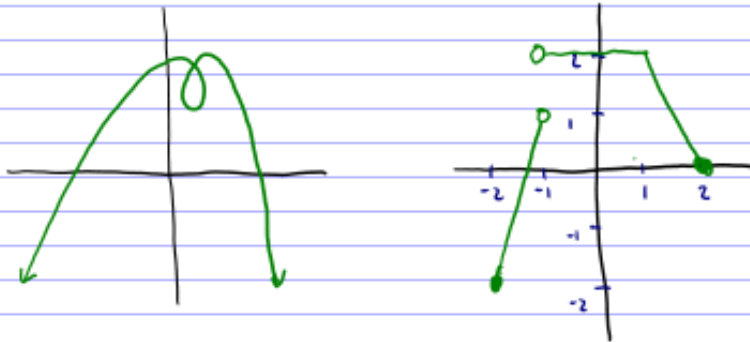
b) $f(2s)$

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Panel 5

Quiz #1 - part 2 -

- ③ Consider the graphs below. Cross out the one that is not a function. For the other, list domain and range.



Domain:

Range:

5

Panel 6

Algebra with Functions

① If $f(x) = 5x^2 + 3$, find $\frac{f(x+h) - f(x)}{h}$

or $f(3s)$

$$f(3s) = 5(3s)^2 + 3 = 45s^2 + 3$$

$$\begin{aligned} \text{② } f(x+h) &= 5(x+h)^2 + 3 = 5(x^2 + 2xh + h^2) + 3 = \\ &= 5x^2 + 10xh + 5h^2 + 3 \end{aligned}$$

$$\begin{aligned} \text{③ } \frac{f(x+h) - f(x)}{h} &= \frac{(5x^2 + 10xh + 5h^2 + 3) - (5x^2 + 3)}{h} = \frac{10xh + 5h^2}{h} \\ &= \frac{h(10x + 5h)}{h} = \underline{\underline{10x + 5h}} \end{aligned}$$

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Panel 7

② If $f(x) = x^2 + 1$ and $g(x) = 2x - 1$, find

a) $f(x) \cdot g(x) = (x^2 + 1)(2x - 1) = 2x^2 - x^2 + 2x - 1$

b) $f(g(x)) = f(2x - 1) = (2x - 1)^2 + 1 = 4x^2 - 4x + 1 + 1 = \underline{4x^2 - 4x + 2}$

$(f \circ g)(x)$

composed with

c) $g(f(x)) = g(x^2 + 1) = 2(x^2 + 1) - 1 = 2x^2 + 2 - 1 = \underline{2x^2 + 1}$

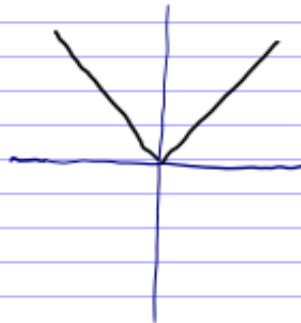
$(g \circ f)(x)$

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Panel 8

About the Absolute Value Function

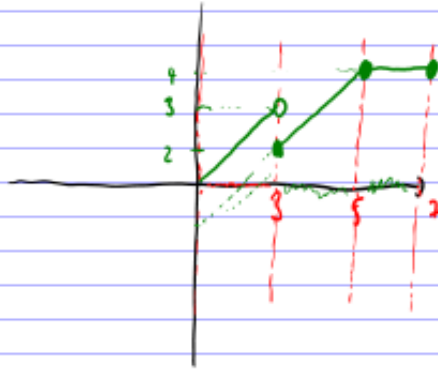
$$f(x) = |x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$$



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Panel 9

Graph $f(x) = \begin{cases} x & \text{if } 0 \leq x < 3 \\ x-1 & \text{if } 3 \leq x \leq 5 \\ 4 & \text{if } 5 < x \leq 7 \end{cases}$



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Panel 10

Shifting and Stretching

Suppose you know graph of $f(x)$:

✓ $f(x) + c$: shift up/down by c

✓ $f(x+c)$: shift left/right by c opposite than you think

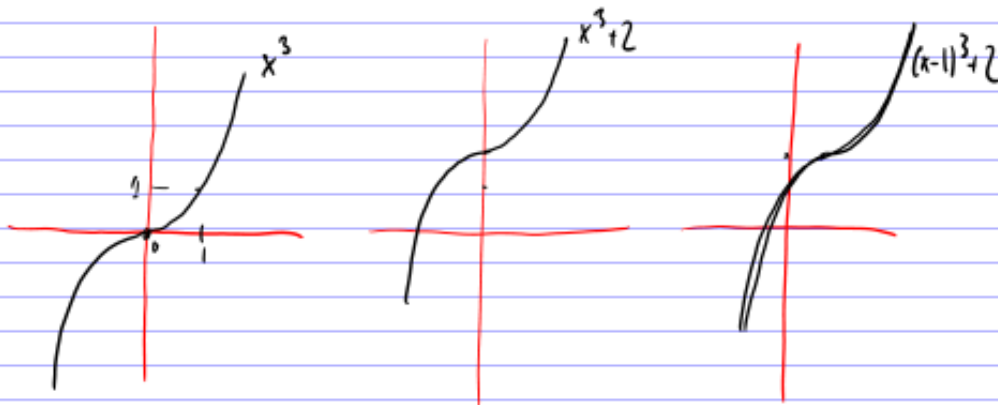
~~width~~ $c f(x)$: expands/contracts y axis (or flips around x -axis)

$f(cx)$: expands/contracts x axis (or flips around y -axis)

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Panel 11

Example: Find the graph of $f(x) = (x-1)^3 + 2$



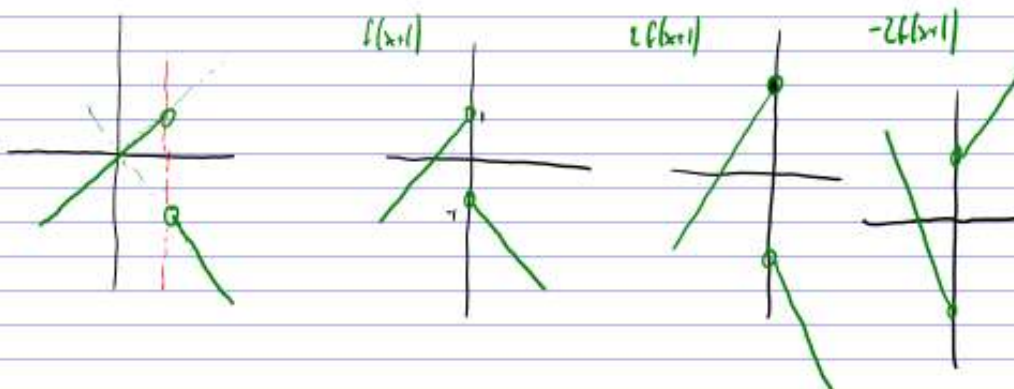
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Panel 12

Example

Sketch the graph of $f(x) = \begin{cases} x & \text{if } x < 1 \\ -x & \text{if } x > 1 \end{cases}$

Then sketch $-2f(x+1)$



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Panel 13

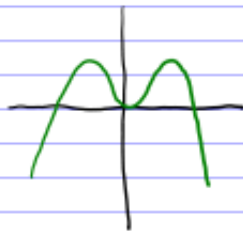
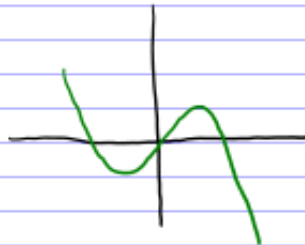
$$\text{If } f(x) = \begin{cases} x & \text{if } x < 1 \\ -x & \text{if } x > 1 \end{cases}, \text{ find } -2f(x+1)$$



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Panel 14

Symmetry: Some functions are symmetric about an axis or a point.

Ex:later

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