

Panel 1

Math 1303: Last time:

- Syllabus,  grading,  web site  
<http://pirate.slu.edu/~wachsmuth/>
- Dyzknow install + setup ✓
- Functions, domain, range:  $f(x) = \frac{\sqrt{x}}{x^2-1}$   $x \geq 0$  but!
- Graph of a function: make a table, plot points, connect
- Verbal line text, function!  
 Graphically finding  
 domain + range

Panel 2

Quiz #1: on Monday Name: \_\_\_\_\_

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

Don't want:  $x^2-2x=0$   
 $x(x-2)=0 \Rightarrow x=2, 0$

Domain:  $x \neq 0, 2$

② If  $f(x) = 2x^2 + 1$ , find

a)  $f(-1) = 3$

b)  $f(2s) = 2(2s)^2 + 1 = 8s^2 + 1$

Panel 3

Quiz #1 - part 2 -

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

Domain:  $[-2, 2]$  except  $x=0$

Range:  $[-2, 2]$  ✓

Panel 4

Algebra with Functions

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

a)  $f(x+h) = 5(x+h) + 3 = 5x + 5h + 3$

b)  $\frac{f(x+h) - f(x)}{h} = \frac{(5x+5h+3) - (5x+3)}{h} = \frac{5x+5h+3-5x-3}{h} = \frac{5h}{h} = 5$

Panel 5

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

a)  $f(x) \cdot g(x) = (x^2 + 1) \cdot (2x - 1) = 2x^3 - x^2 + 2x - 1$

b)  $(f \circ g)(x) = f(g(x)) = f(2x - 1) = (2x - 1)^2 + 1$  ← *forget it out*  
 $4x^2 - 4x + 1 + 1 = 4x^2 - 4x + 2$

c)  $(g \circ f)(x) = g(f(x)) = g(x^2 + 1) = 2(x^2 + 1) - 1$   
 $= 2x^2 + 2 - 1 = 2x^2 + 1$

$(f \circ g) \neq (g \circ f)$        $f \circ g \neq g \circ f$

Panel 6

About the Absolute Value Function

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

Graph

Panel 7

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

Domain:  $[0, 7]$   
 Range:  $[0, 4]$

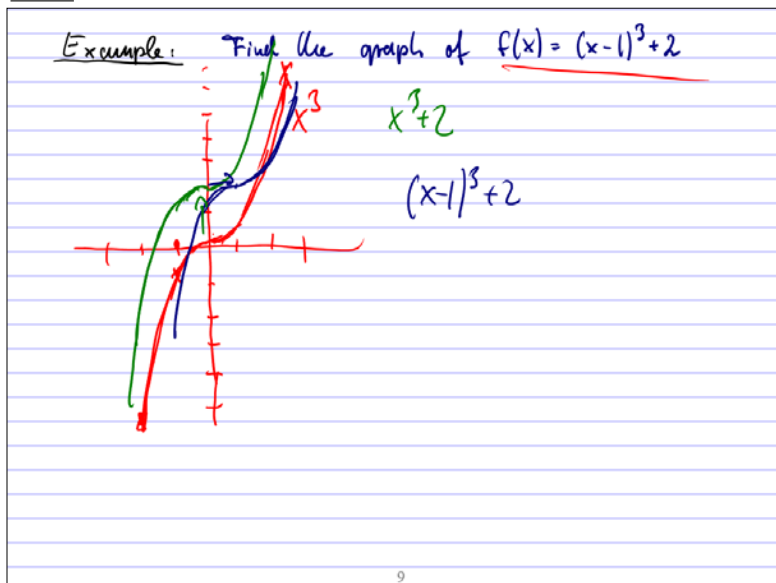
Panel 8

Shifting and Stretching

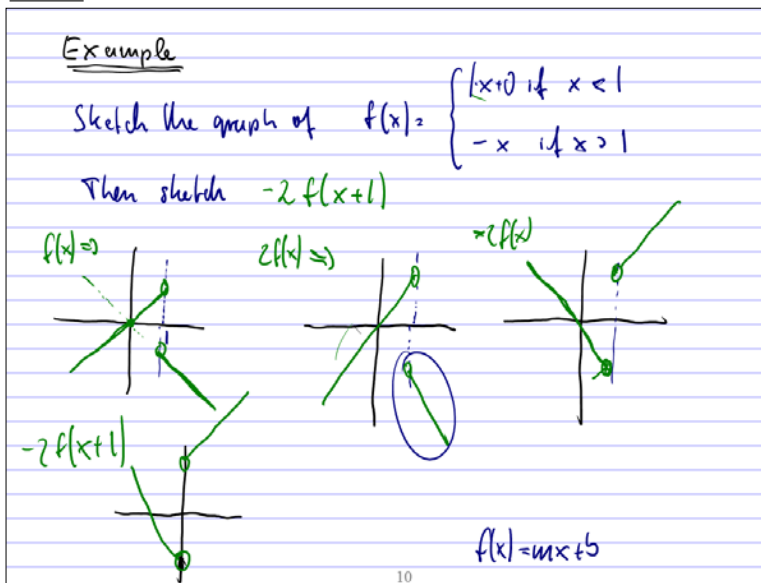
Suppose you know graph of  $f(x)$ :

- ✓  $f(x) + c$ : goes up (if  $c > 0$ ) or down ( $c < 0$ ) by  $c$
- ✓  $f(x + c)$ : goes left ( $c > 0$ ) or right ( $c < 0$ ) by  $c$
- ≈  $c f(x)$ : expands ( $c > 1$ ) or shrinks ( $c < 1$ ) or flips ( $c < 0$ )
- ✓  $f(cx)$ : expands x-axis ( $c < 1$ ) or shrinks x-axis ( $c > 1$ ) or flips ( $c < 0$ )

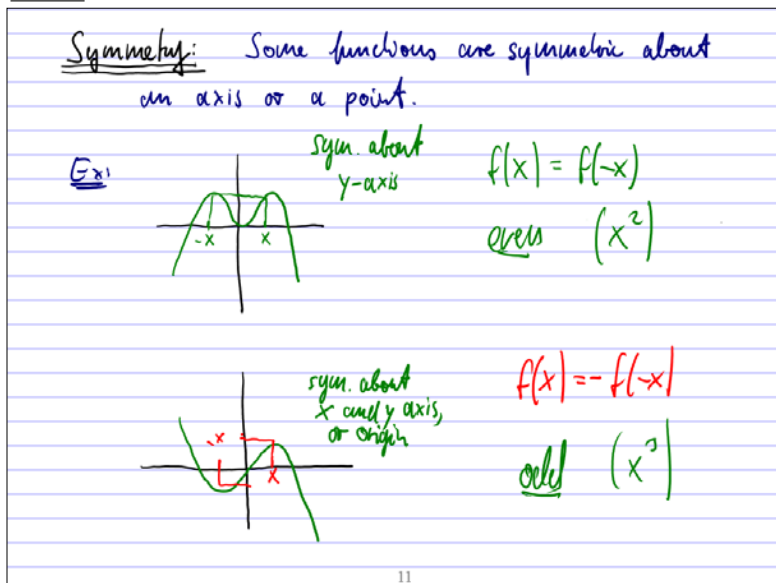
Panel 9



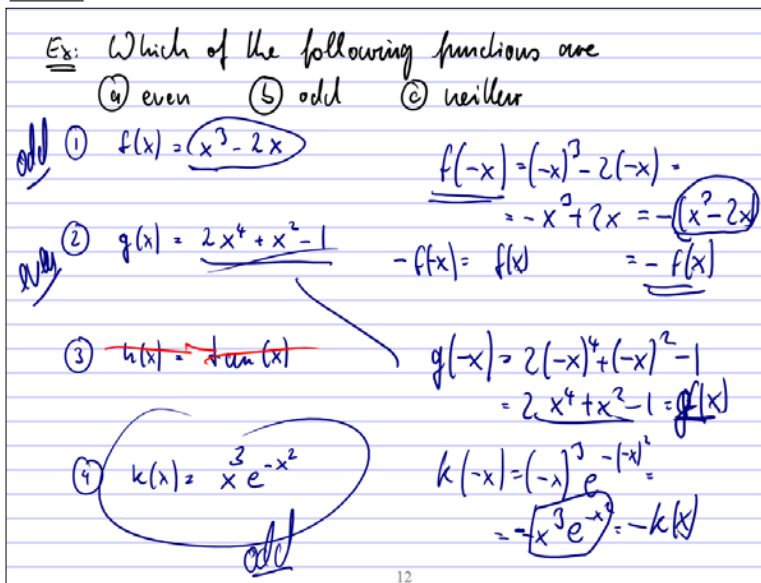
Panel 10



Panel 11



Panel 12



Panel 13

Wolfram Alpha

can numeric addition  
multiplication  
division } by hand, then  
Calculator

learn algebraic expressions  
factoring  
graphing, basic function } by hand, then  
W Alpha.

Is  $x^3 e^{-x^2}$  even or odd?

13