Panel 1

Math 1303: Last time:

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

1

Panel 2

Name:

Quiz #1:

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

Bad: $x^2 - 2x = 0$

$x(x-2) = 0 \Rightarrow x = 0, 2$

$\Rightarrow$ Domain: $\mathbb{R} - [0,2]$

② If $f(x) = 2x^2 + 1$, find

a) $f(-1) = 2(-1)^2 + 1 = 3$

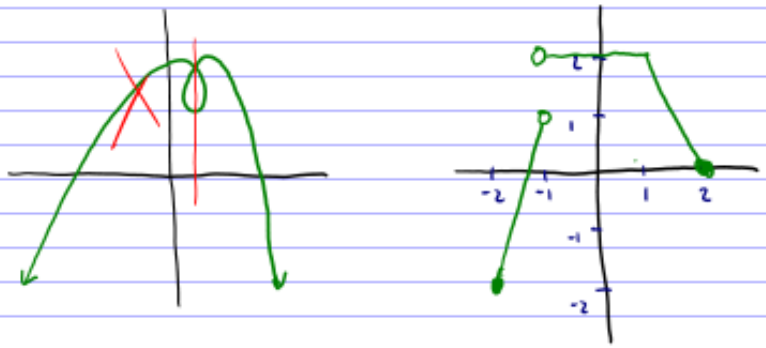
b) $f(2s) = 2(2s)^2 + 1 = 8s^2 + 1$

2

Panel 3

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: $-2 \le x \le 2$ except $x = -1$

Range: $[-2, 2]$

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Panel 4

pg 86 #57 If $f(x) = 5x + 3$ find $\frac{f(3+h) - f(3)}{h}$

$f(3+h) = 5(3+h) + 3 = 15 + 5h + 3 = 18 + 5h$

$f(3) = 18$ ✓

$\frac{f(3+h) - f(3)}{h} = \frac{18 + 5h - 18}{h} = \frac{5h}{h} = 5$

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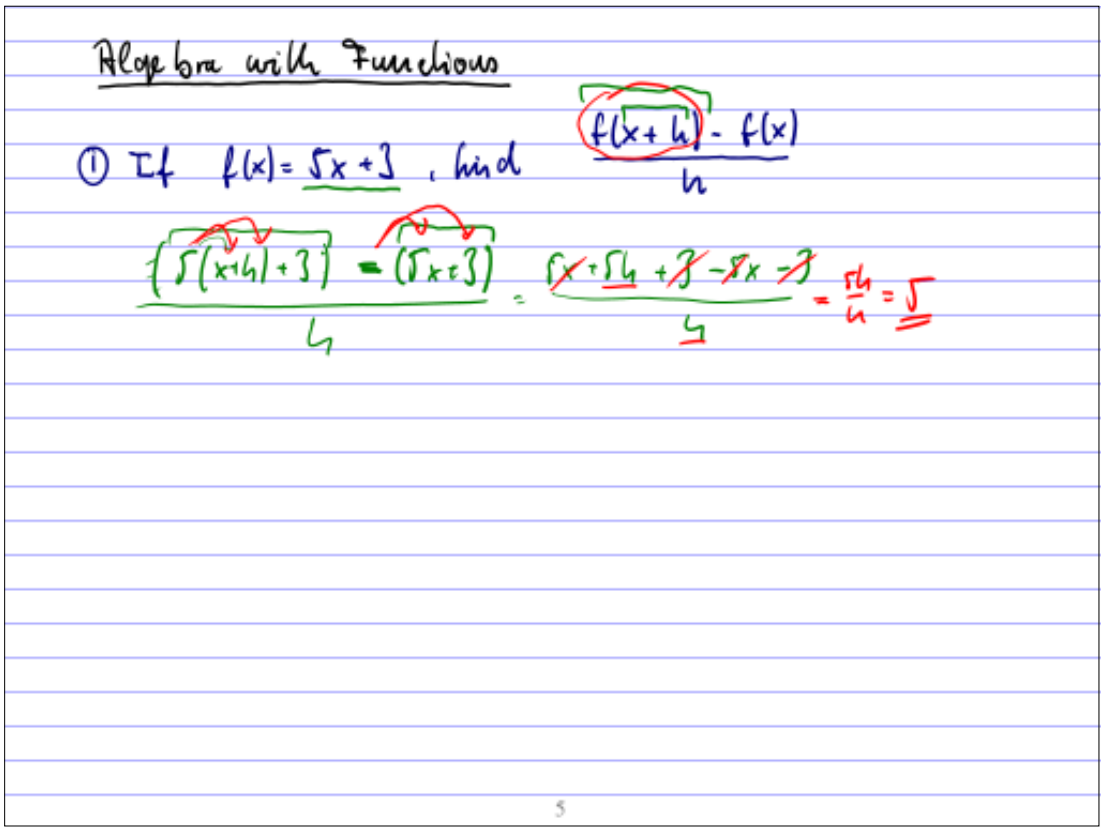
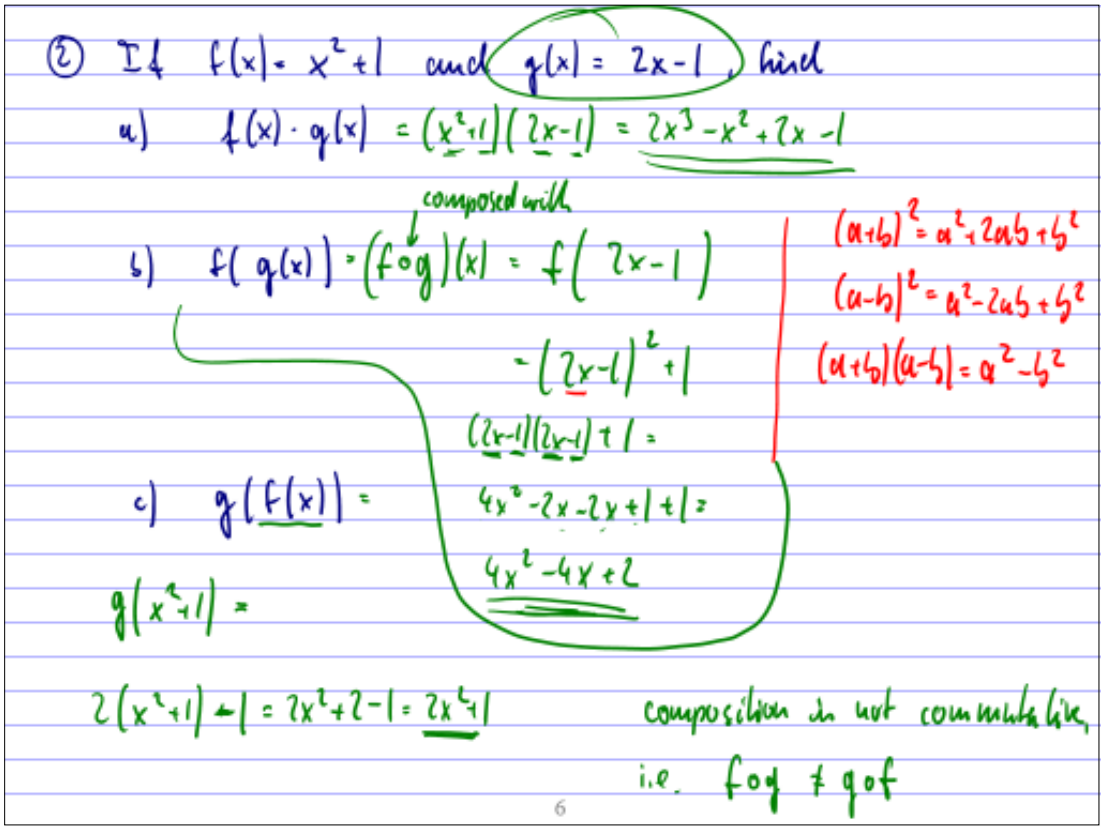
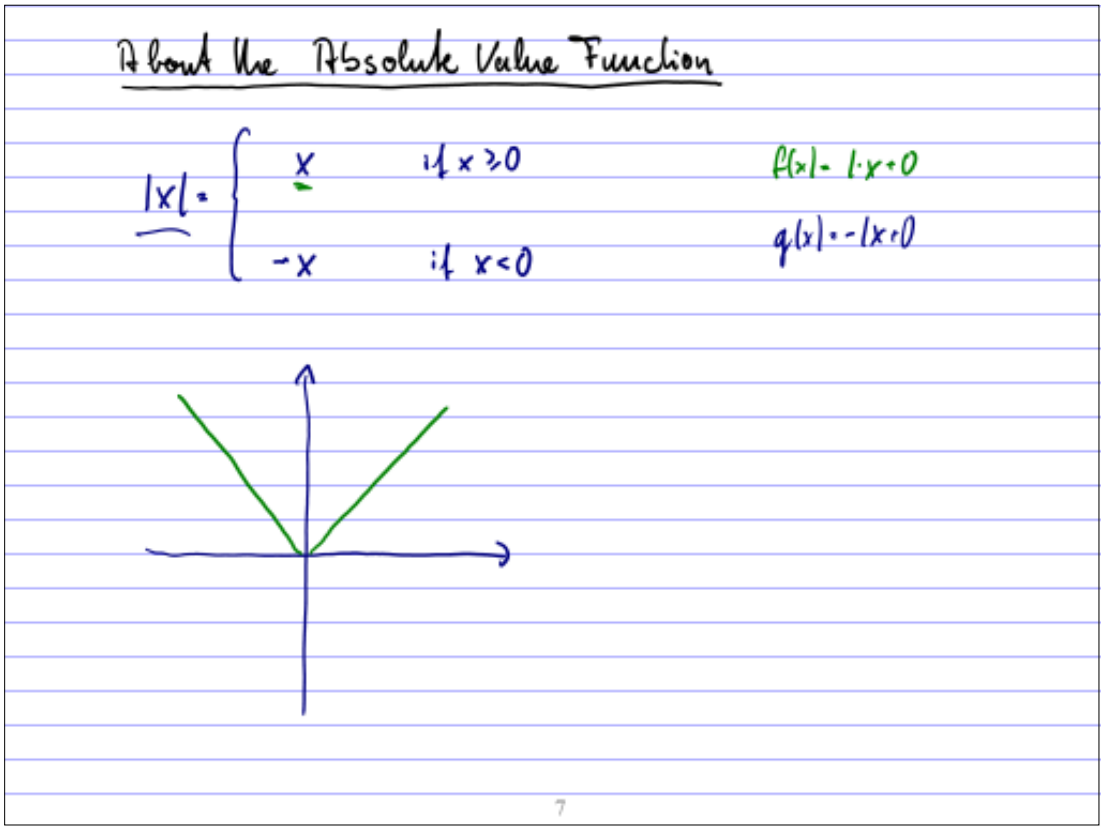
Panel 5



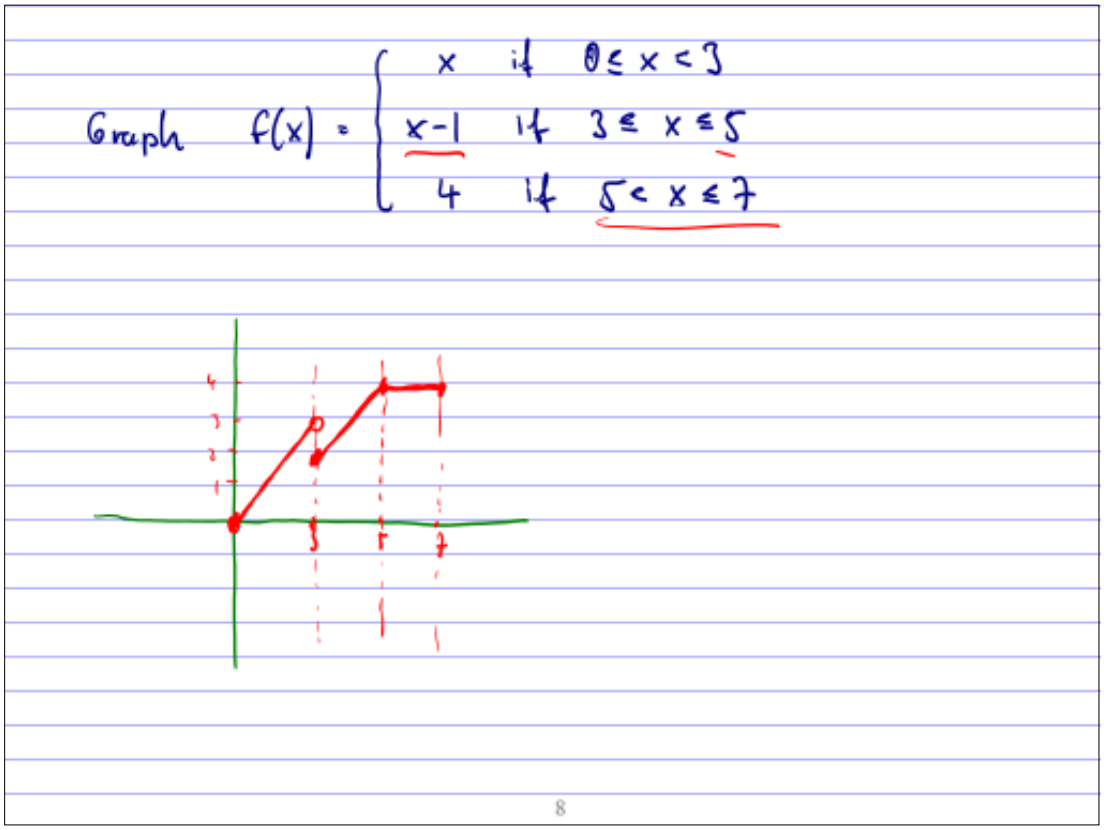
Panel 6



Panel 7



Panel 8



Panel 9

Shifting and Stretching

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

$f(x) \pm c$: shift graph up/down by c

$f(x+c)$: shifted left/right by c (opposite!)

$c\,f(x)$: multiplies $f(x)$ - y-axis by c

$f(cx)$: multiplies x-axis by c

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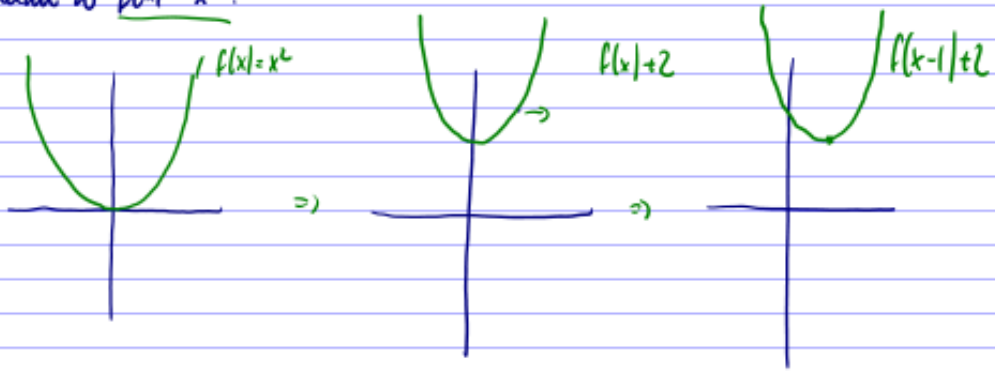
Panel 10

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

Relate to $f(x) = x^2$:



somewhat useful!

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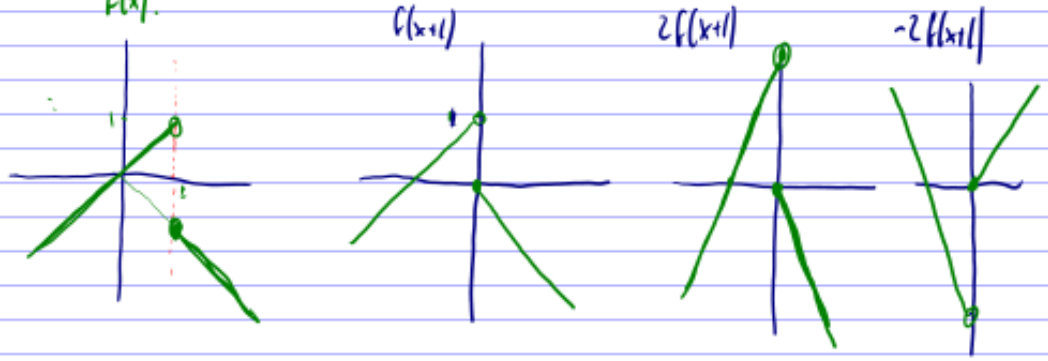
Panel 11

Example

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

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



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Panel 12

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

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

$$= \begin{cases} -2x-2 & \text{if } x \le 0 \\ 2x+2 & \text{if } x > 0 \end{cases}$$

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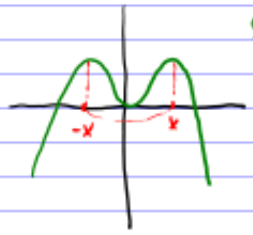
Panel 13

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

Ex:

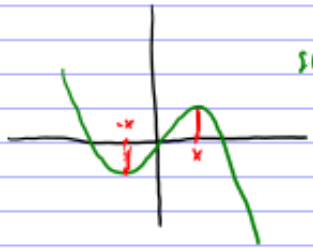


symmetric about y-axis

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

even function

$(-x)^2 = x$



symmetric about origin

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

odd function

$(-x)^3 = -x$

$-(-x)^3 = x$

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Panel 14

Ex: Which of the following functions are
(a) even (b) odd (c) neither

(1) $f(x) = x^3 - 2x$

$f(-x) = (-x)^3 - 2(-x) = -x^3 + 2x =$

$= -(x^3 - 2x) = -f(x)$

odd

(2) $g(x) = 2x^4 + x^2 - 1$

$g(-x) = 2(-x)^4 + (-x)^2 - 1 = 2x^4 + x^2 - 1 = g(x)$

even

(3) $h(x) = \tan(x)$

(4) $k(x) = x^3 e^{-x^2}$

$k(-x) = (-x)^3 e^{-(-x)^2} = -x^3 e^{-x^2}$

$= -k(x)$ odd

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Panel 15

Maple 1

learn numeric addition
multiplication
division

next time

learn algebraic expressions
factoring
graphing, basic function

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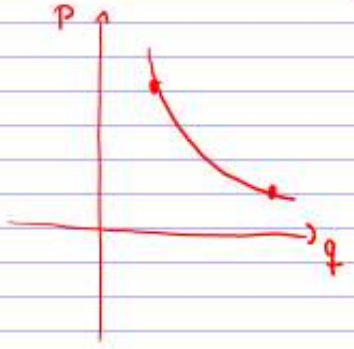
Panel 16

Demand Curve

For each price level of a product there is a corresponding quantity of that product that consumers want.

demand as price as a function of quantity q

P



demand curve is decreasing, or going down

$P = p(q)$

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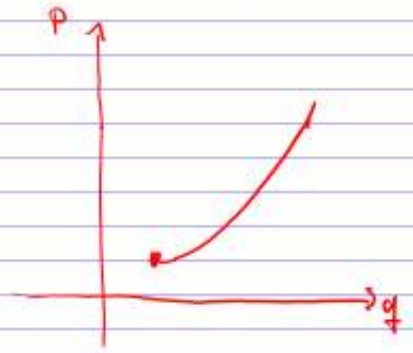
Panel 17

Supply Curve

For each price level of a product there is a corresponding quantity of that product that **producers** are willing to supply

$p = p(q)$



Supply curve usually goes up, or increasing

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Panel 18

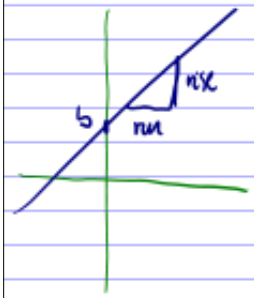
Want to study supply/demand curves

⇒ easiest relationship between supply, demand, and price is: linear

Recall:

① $f(x) = mx + b$ slope-intercept form

① $y - y_1 = m(x - x_1)$ point-slope form



✓ $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}}$

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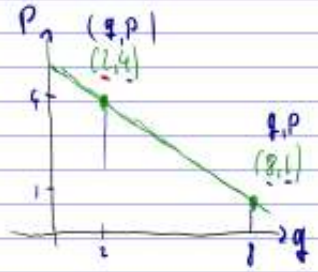
Panel 19

Example: Suppose a price-quantity curve is as shown:



Find the equation and determine if this is likely a demand or supply curve?

$$m = \frac{1-4}{8-2} = \frac{-3}{6} = -\frac{1}{2}$$

$$y - 4 = -\frac{1}{2}(x-2) \quad (=) \quad p - 4 = -\frac{1}{2}(q-2)$$

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