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

p 86 # 9: $f(t) = \frac{1}{\sqrt{t-1}}$ want: $t - 1 > 0$

$t > 1$ domain

#17 $f(x) = 5x + 3$ $\frac{f(3+h) - f(3)}{h}$

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

$f(3) = 18$

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

2

Panel 3

Name:

Quiz #1:

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

Bad: $x^2 - 2x = 0$ Domain: $\mathbb{R} - \{0, 2\}$

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

② If $f(x) = 2x^2 + 1$, find $f(\square) = 2(\square)^2 + 1$

a) $f(-1) = 3$

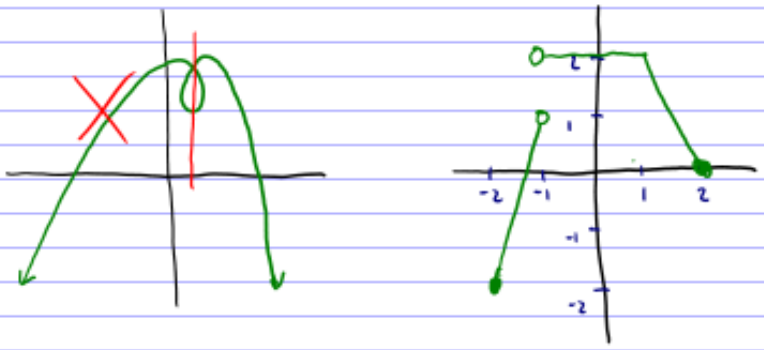
b) $f(2s) = 2(2s)^2 + 1 = 8s^2 + 1$

3

Panel 4

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: $[-2, 2]$ except for -1

Range: $-2 \leq x \leq 2$

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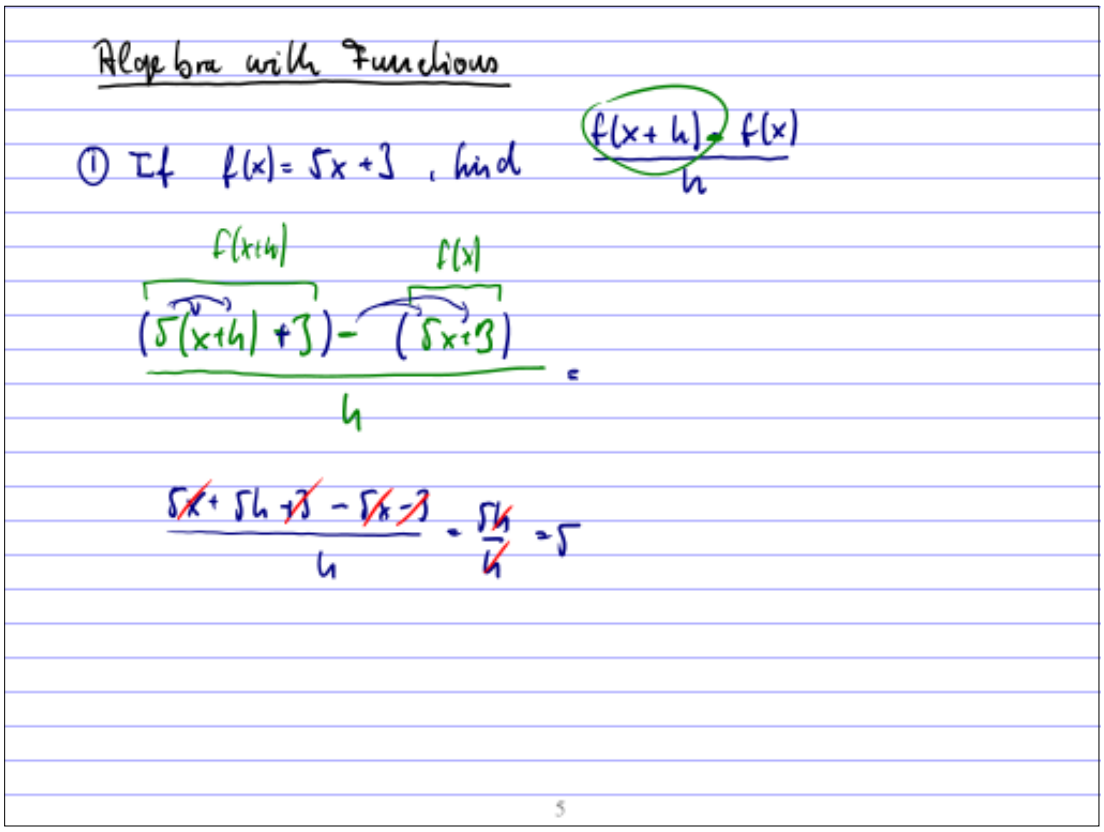
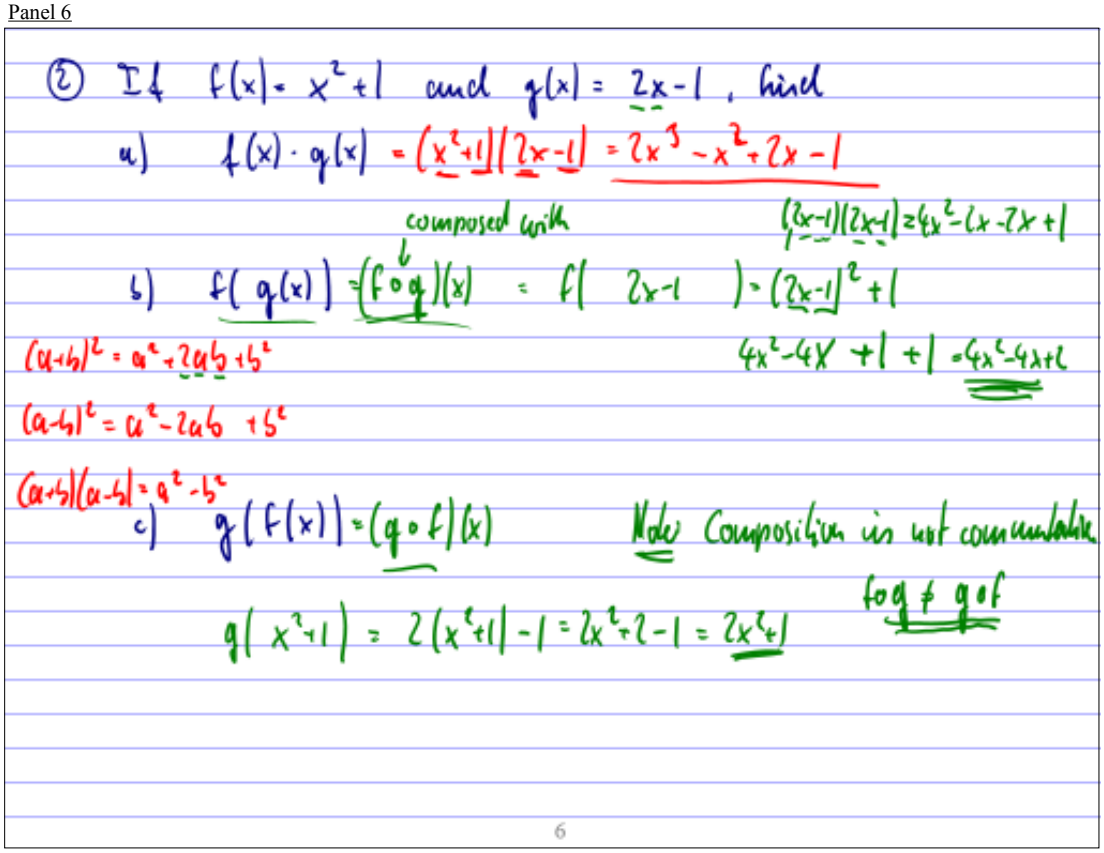
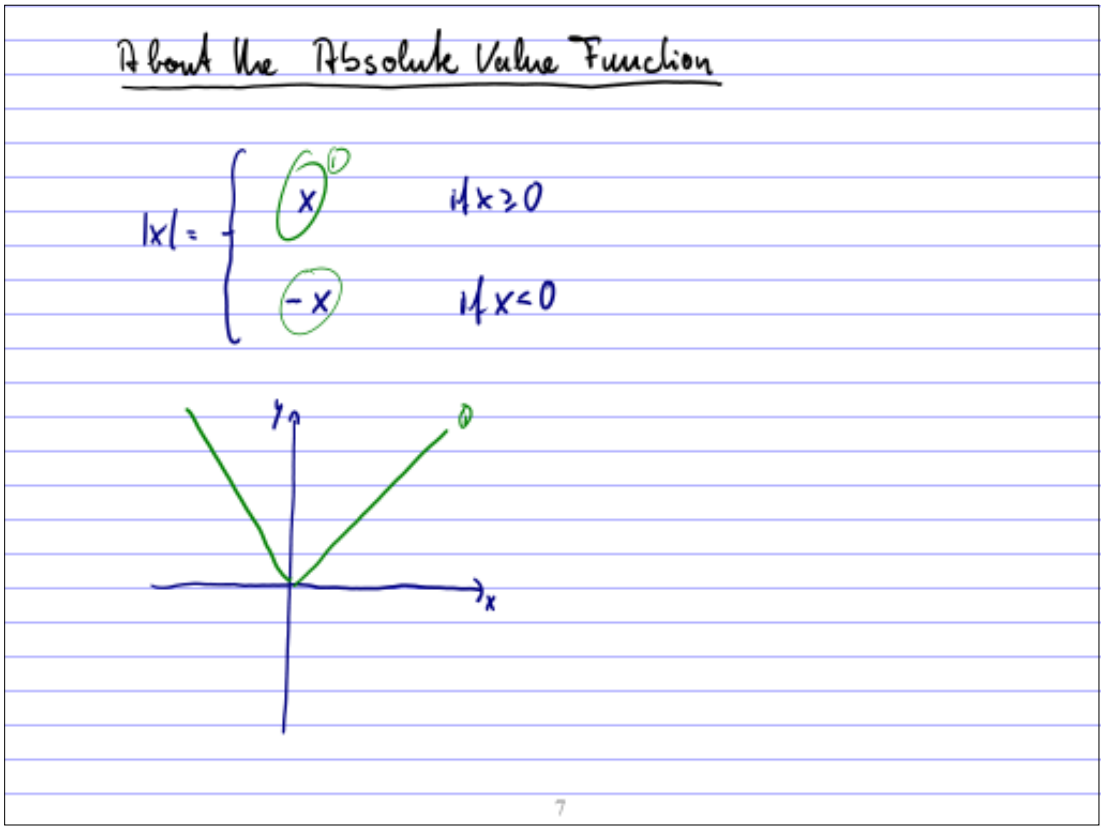
Panel 5



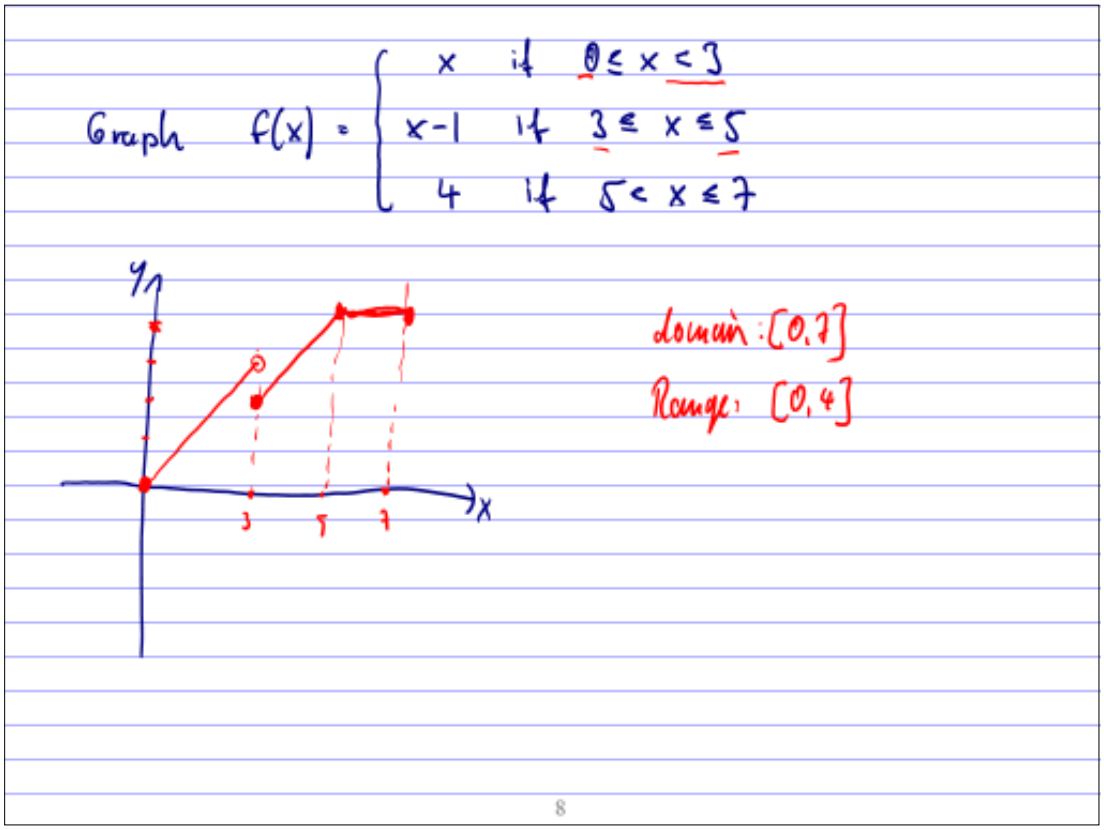
Panel 6



Panel 7



Panel 8



Panel 9

Shifting and Stretching

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

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

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

$c\,f(x)$: scale y-axis, i.e. multiply y-values by c

$f(cx)$: scale x-axis, i.e. multiply x-values by c

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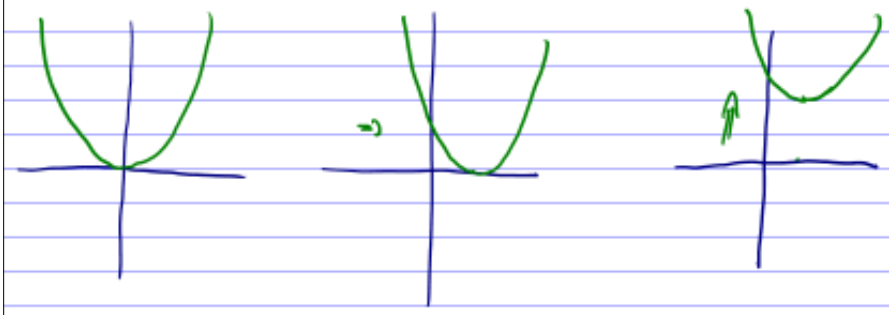
Panel 10

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

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



"some calculus we'll do"

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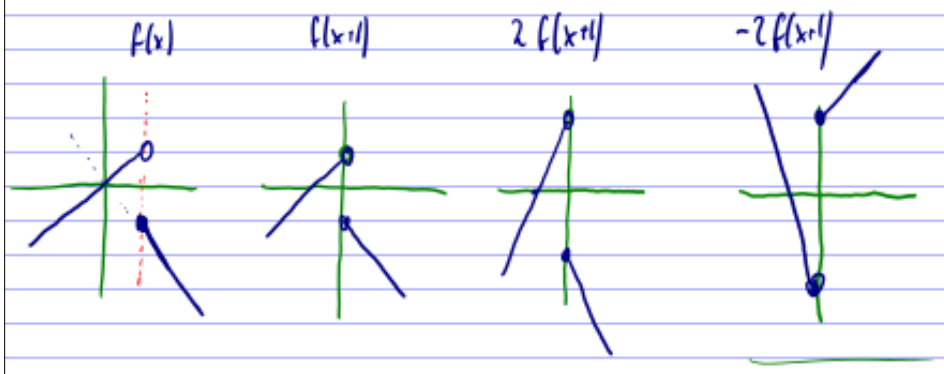
Panel 11

Example

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

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



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Panel 12

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

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

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

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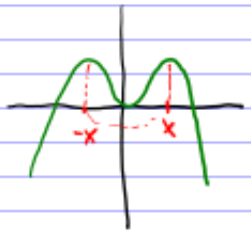
Panel 13

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

Ex:

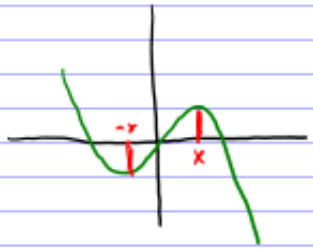


symmetric about y-axis

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

even

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



symmetric about origin (0,0)

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

odd

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

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Panel 14

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

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

odd

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

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

(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

next time

learn numeric addition
multiplication
division

learn algebraic expressions
factoring
graphing, basic function

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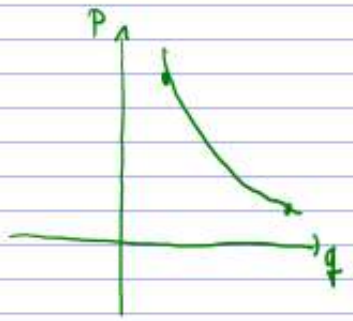
Panel 16

Demand Curve

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



$p = p(q)$ p - price, q - quantity

demand curve $p = p(q)$ is decreasing, or goes down.

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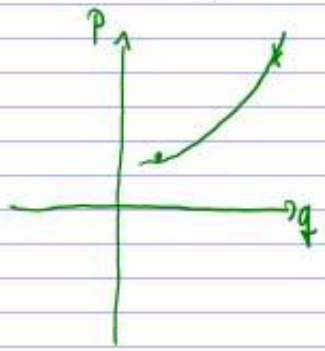
Panel 17

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) a supply curve is increasing, goes up.

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Panel 18

Want to study supply/demand curves

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

$y = mx + b$ slope-intercept

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

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

$ax + by = c$ general form

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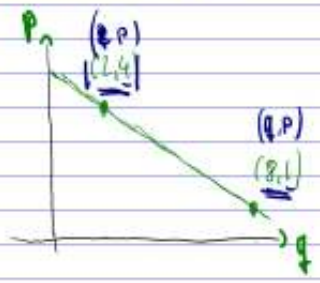
Panel 19

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



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

demand curve (because decreasing)

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

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

$$p - 4 = -\frac{1}{2}(q - 2)$$ or $$p - 4 = -\frac{1}{2}q + 1$$

$$p = -\frac{1}{2}q + 5$$