Panel 1

Last time:

Functions, domain, and range. ✓ $f(x)+c$ shift up

Shifting up/down/right/left ✓ $f(x)-c$ down; $f(x+c)$ left; $f(x-c)$ right

Symmetry $f(-x) = f(x)$ even; $f(-x) = -f(x)$ odd

Piecewise defined functions ✓

Algebra with function $f \circ g$, $\frac{f(x+h)-f(x)}{h}$

1

Panel 2

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

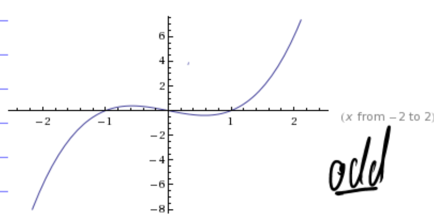
① $f(x) = x^5 - 7x^3 + 2x$

$f(-x) = -x^5 + 7x^3 - 2x = -(x^5 - 7x^3 + 2x) = -f(x)$ odd

② $g(x) = 3x^4 + 5x^2 + 7$

$g(-x) = 3x^4 + 5x^2 + 7 = g(x)$ even

③ $h(x) = \frac{x^3 - 2x}{x^4 + 1}$; $h(-x) = \frac{-x^3 + 2x}{x^4 + 1} = -\frac{x^3 - 2x}{x^4+1} = -h(x)$ odd

④ 

odd

$k(x) = x + x^2$

$k(-x) = -x + x^2 \neq k(x)$ neither

$= -(x - x^2) \neq -h(x)$

2

Panel 3

32.) $f(x) = 5x + 3$, $\frac{f(3+h) - f(3)}{h}$

p 86

$f(3+h) = 5(3+h) + 3 = 15 + 5h + 3 = \underline{18 + 5h}$

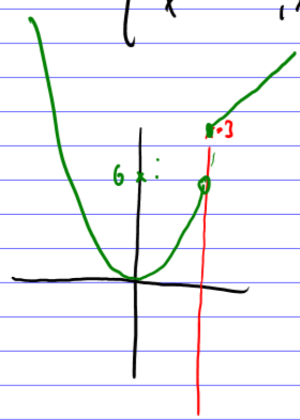
$f(3) = 5 \cdot 3 + 3 = 18$

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

3

Panel 4

$$f(x) = \begin{cases} x + 6 & , x \geq 3 \\ x^2 & , x < 3 \end{cases}$$



4

Panel 5

Quiz #1

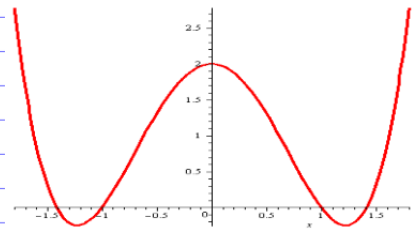
Name: ______

① If $f(x) = \frac{4}{x^2 - 3x}$, find the domain of f

② Are the following functions even, odd, or neither:

a) $f(x) = 3x^3 - 4x$

b)

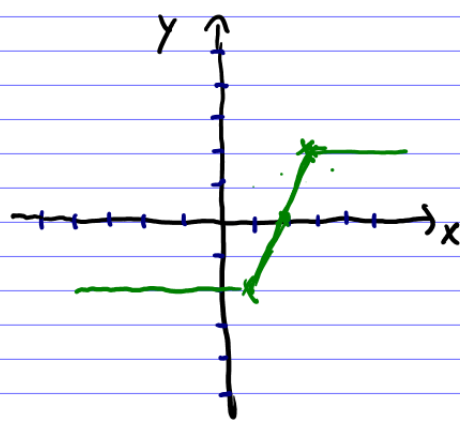


5

Panel 6

③ If $g(x) = 3x + 1$, find $\frac{g(4+h) - g(4)}{h}$

④ The graph of a function $f(x)$ is shown on the right. Based on that, draw the graph of $f(x+1)+2$



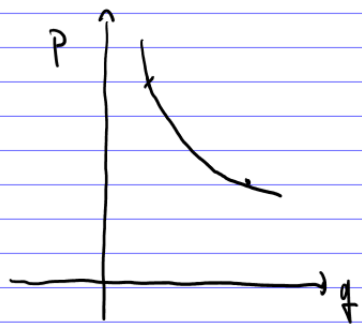
6

Panel 7

Demand Curve

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

$\Rightarrow$ represent price p as a function of quantity q. $p = p(q)$



Demand curve goes down (decreasing)

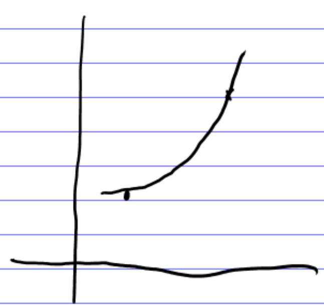
7

Panel 8

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 goes up (increasing)

8

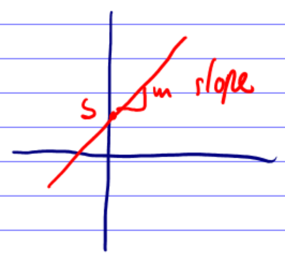
Panel 9

Want to study supply/demand curves

⇒ easiest relationship between supply, demand, and price

is: linear relation

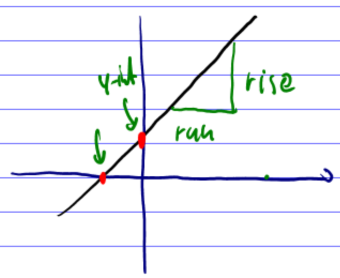
Need to review $y = mx+b$



9

Panel 10

<u>Review of Lines</u> $y = mx+b$



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

slope-intercept: $y=mx+b$

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

y-intercept: set $x=0$

x-intercept: set $y=0$

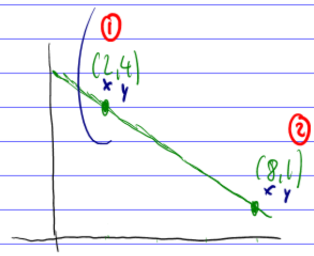
Two lines are parallel if: slopes are same, $m_1=m_2$

Two lines are perpendicular if: $m_1 = -1/m_2$

10

Panel 11

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



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

goes down ⇒ demand equation

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1-4}{8-2} = \frac{-3}{6} = -\frac{1}{2}$$

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

11

Panel 12

Ex: Find equation of line with slope 2 through (1,-3)

$$y + 3 = 2(x - 1)$$

Ex: Find equation of line through (-3,8) and (4,-2)

$$m = \frac{-2-8}{4+3} = \frac{-10}{7}$$

$$y - 8 = \frac{-10}{7}(x + 3)$$

12

Panel 13

0. forms of linear functions

$ax + by + c = 0$ is general equation of a line

Ex: $y = -\frac{2}{3}x + 4$ to general form:

$y + \frac{2}{3}x - 4 = 0 \quad | \cdot 3$

$\boxed{3y + 2x - 12 = 0}$

Ex: $3x + 4y - 12 = 0$ $\quad 4y = -3x + 12 \quad | \; y = -\frac{3}{4}x + 3$

slope: $-3/4$

x-int: 4 (set $y = 0$)

y-int: 3 (set $x = 0$)

13

Panel 14

Ex: Suppose the demand per week for a product is 100 units when the price is \$58 and 200 at \$51 each.
Find the demand equation assuming it is linear.

$(100, 58) \quad (200, 51)$

$m = \frac{51 - 58}{200 - 100} = -\frac{7}{100}$

$p - 58 = -\frac{7}{100} \cdot (q - 100)$

14

Panel 15

Systems of Equations

Want to setup production schedule for 2 models of a new product.

Model A: 4 resistors, 9 transistors

Model B: 5 resistors, 14 transistors

From supplier we can get 335 resistors and 850 transistors daily. How many A's, B's should I make?

$x = \#$ model A $y = \#$ model B

resistors: $4x + 5y = 335$

transistors: $9x + 14y = 850$

15

Panel 16

Solving System of Equations

(A) Elimination Method: multiply one or both equations so that same variable has same coefficients. Then subtract both equations.

$4x + 5y = 335 \quad | \cdot 9 \qquad 36x + 45y = 3015$

$9x + 14y = 850 \quad | \cdot 4 \qquad 36x + 56y = 3400$

$\ominus \qquad / \quad 11y = 385 \qquad y = \frac{385}{11} = 35$

$4x + 175 = 335$

$4x = 160, \qquad x = 40$

16