What we've covered is highlighted.:

1. What's differential calculus? Extension of simple concept of slope of a straight line, with *limits*.
    a. Quick mention of integral calculus as extension of concept of area of a rectangle, with *limits*.
2. 4 ways to represent a function
3. Evaluating Functions
4. Domain of a Function
5. Families of Functions
    a. Power Functions
    b. Lines
    c. Trig functions
6. Moving functions around (Graphing by transforming). (Started)
7. Piecewise-Defined Functions
8. Domain of sum/difference/product of two functions
9. Domain of quotient of two functions
10. Domain of the Composition of two functions.
11. Evaluating a composite function from table or graph of two functions
12. Numerical approximations of average slope and the two versions of average slope (i.e., slope of the secant line.)

$$(x_1, y_1) = (x, f(x)) = (x_1, f(x_1)) \text{ and } (x_2, y_2) = (x+h, f(x+h)) = (x_2, f(x_2))$$
$$\Rightarrow$$
$$m_{avg} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{f(x+h) - f(x)}{h} = \frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

When we're done with piecewise-defined, I think that finishes 1.1, and pretty much all of 1.2. Section 1.3 is basically #s 8 - 10, above. Section 1.4 is #12.

Lines based on $f(x) = x$

Recall $-3(x-2)^2+5$ $\qquad y = mx + b$

$= a(x-h)^2 + K$

$x^{2/3}$ $\qquad (h,k) = \text{vertex}$: It's where $(0,0)$

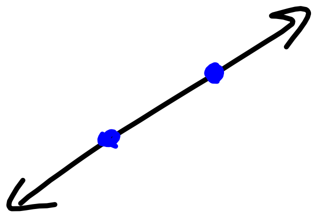
$x^{3/5}$ $\qquad$ got moved to from $f(x) = x^2$

Line : Passes thru a point (x_1, y_1) with slope m.

$y = m(x - x_1) + y_1$ thru (x_1, y_1) with slope m.

Background :

$$m = \frac{y_2 - y_1}{x_2 - x_1} = m$$

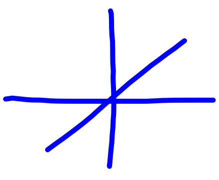


$y_2 - y_1 = m(x_2 - x_1)$

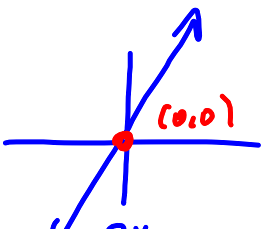
$y_2 = m(x_2 - x_1) + y_1$

$y = m(x - x_1) + y_1$ Point-Slope Form

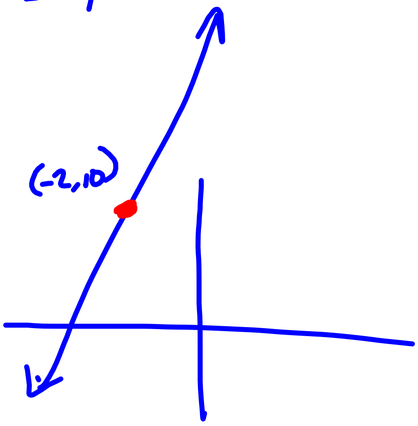
$y = 3(x+2) + 10$



x



3x



Last time Basic moves

$af(x)$, $f(ax)$, $f(x+a)$, $f(x)+a$

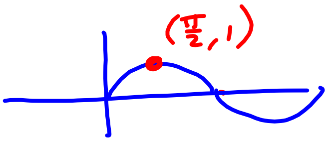
(x, ay), $(\frac{1}{a}x, y)$, $(x-a, y)$, $(x, y+a)$

$f(x) = \sin x$

$3x - 6 = 3(x-2)$

$a \sin(bx+c) + d$

$= a \sin(b(x+\frac{c}{b})) + d$



$3\sin(-2x-\pi)+5$

$= 3\sin(-2(x+\frac{\pi}{2}))+5$

① $\sin x$ $(\frac{\pi}{2}, 1)$

② $3\sin x$ $(\frac{\pi}{2}, 3)$ 3 times y-val.

③ $3\sin(-2x)$ $(-\frac{\pi}{4}, 3)$ $-\frac{1}{2}$ times x-val.

④ $3\sin(-2(x+\frac{\pi}{2}))$

left $\frac{\pi}{2}$

x-val minus $\frac{\pi}{2}$

$(-\frac{3\pi}{4}, 3)$

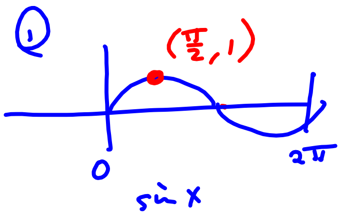
$-\frac{\pi}{4} - \frac{\pi}{2} = -\frac{3\pi}{4}$

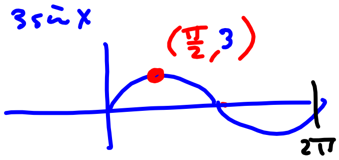
⑤ $3\sin(-2(x+\frac{\pi}{2}))+5$

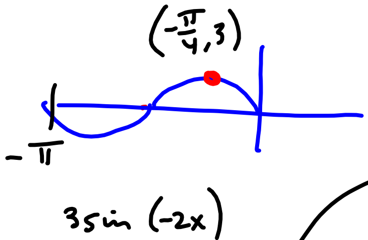
up 5

y-val. + 5

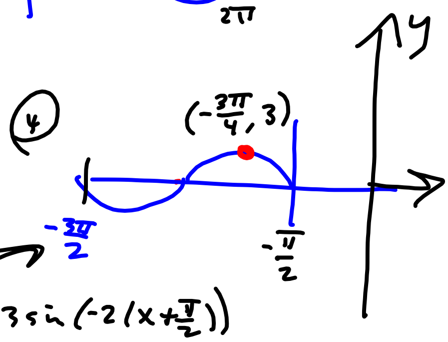
$(-\frac{3\pi}{4}, 8)$

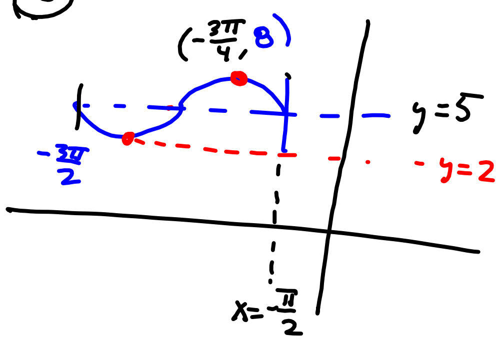






$-\pi - \frac{\pi}{2} = -\frac{3\pi}{2}$



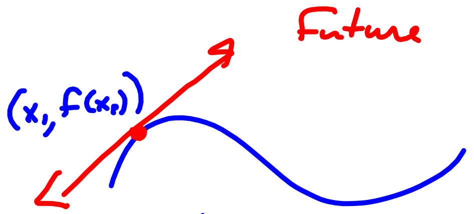


3 $3\sin(-2x)$

No rule for replacing $-2x$ by $-2x-\pi$

4 $3\sin(-2x-\pi)$

student moves it right π & totally blows it.



$y = m(x - x_1) + y_1$

$= m(x - x_1) + f(x_1)$

Piecewise-Defined Functions.

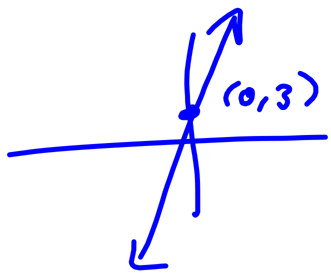
Graph $f(x) = \begin{cases} -x^2-4x-1 & \text{if } x < -1 \\ 2x+3 & \text{if } x \geq -1 \end{cases}$

$x < -1$ $\qquad\qquad\qquad$ $x \geq -1$

$f_1(x) = -x^2-4x-1 \iff$ $\qquad$ $f_2(x) = 2x+3$

$-f_1(x) = x^2+4x+1 \iff$

$-f_1(x) - 1 = x^2+4x \iff$



$-f_1(x) - 1 + 4 = x^2+4x+2^2$

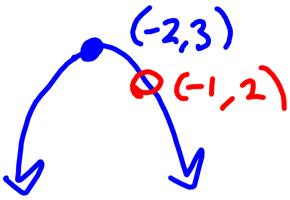
$-f_1(x) + 3 = (x+2)^2$

$-f_1(x) = (x+2)^2 - 3$

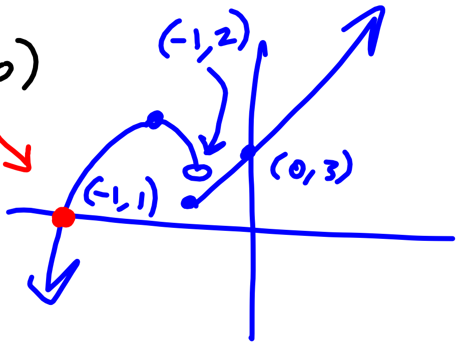
$f_1(x) = -(x+2)^2 + 3$

$x = -1 \quad = 2(-1)+3 = 1$

$(-1, 1)$



$(-2-\sqrt{3}, 0)$



$f_1(-1) = -(-1)^2 - 4(-1) - 1$

$= -1 + 4 - 1 = 2$

$-(x+2)^2 + 3 \overset{SET}{=} 0$

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

$(x+2)^2 = 3$

$x+2 = \pm\sqrt{3}$

$x = -2 \pm \sqrt{3}$

1.1 Due Friday
1.2 Monday
1.3 Monday
1.4 Tuesday
1.5 Tuesday or Wednesday, and that's as far out as I'm going.

		Classes (50 minutes)	
CHAPTER 1 - FUNCTIONS AND LIMITS			
1.1	Four Ways to Represent a Function	1	
1.2	Mathematical Models	2	Week 1
1.3	New Functions from Old Functions	1	
1.4	The Tangent and Velocity Problems	1	
1.5	The Limit of a Function	2	
1.6	Calculating Limits Using the Limit Laws	2	Week 2
1.7	The Precise Definition of a Limit	2	
1.8	Continuity	1	
Review		1	
TEST 1 – Chapter 1		1	Thursday, Week 3 is target date for Test 1