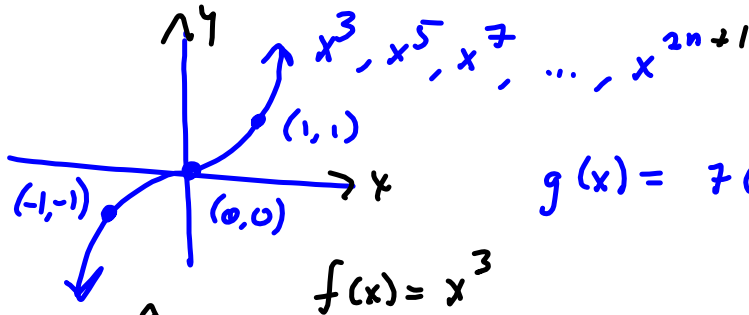


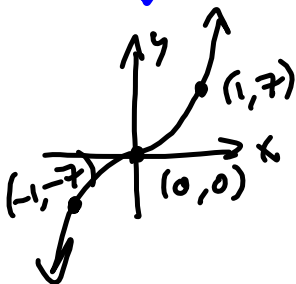
Writing Project #2

Basic Functions.

$y = 1, x, x^3$



$g(x) = 7(5x-10)^3 - 11$



$y \mapsto 7y$

$7f(x-10) = 7(x-10)^3$
 $x \mapsto x+10$

RIGHT SHIFT
 BY 10
 ("Delay")

Horizontal
 shrink
 by factor
 of 5

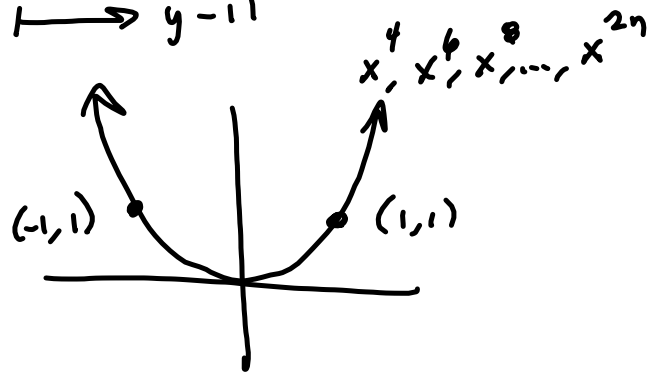
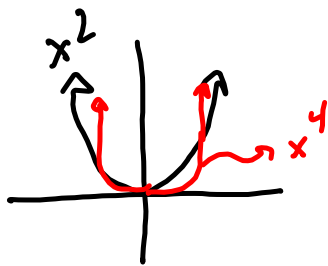
$7f(5x-10) = 7(5x-10)^3$
 $x \mapsto \frac{1}{5}x$

$x+10$
 "Advance"
 by 10
 Left 10

$$7f(5x-10) - 11 = 7(5x-10)^3 - 11$$

Down 11!

$$y \rightarrow y - 11$$



For the complete library of basic
functions: WP#2 on harryzaims.com

<http://harryzaims.com/121-all/videos/03-Writing-Projects/Writing-Project-2/>

$f(x)$

$$a f(bx + c) + d$$

Diagram illustrating the components of the function $f(x) = a f(bx + c) + d$. Red arrows point from circled numbers 1, 2, 3, and 4 to the terms a , $bx + c$, f , and d respectively.

$$a f(bx + c) + d = a f\left(b\left(x + \frac{c}{b}\right)\right) + d$$

Diagram illustrating the components of the function $f(x) = a f\left(b\left(x + \frac{c}{b}\right)\right) + d$. Red arrows point from circled numbers 1, 2, 3, and 4 to the terms a , b , $x + \frac{c}{b}$, and d respectively.

$$7x^2 - 6x - 9 = 0$$

$$x^2 - \frac{6}{7}x - \frac{9}{7} = 0$$

$$x^2 - \frac{6}{7}x = \frac{9}{7}$$

$$x^2 - \frac{6}{7}x + \left(\frac{3}{7}\right)^2 = \frac{9}{7} + \frac{9}{49} = \frac{9 \cdot 7}{7 \cdot 7} + \frac{9}{49}$$

$$= \frac{63+9}{49}$$

$$= \frac{72}{49}$$

$\frac{\frac{6}{7}}{2} = \frac{6}{7} \cdot \frac{1}{2} = \frac{3}{7}$

$$\left(x - \frac{3}{7}\right)^2 = \frac{72}{49}$$

$$x - \frac{3}{7} = \pm \sqrt{\frac{72}{49}} = \pm \frac{\sqrt{72}}{\sqrt{49}}$$

$$= \pm \frac{6\sqrt{2}}{7}$$

$$\begin{array}{r} 2 \overline{)72} \\ \underline{2} \\ 2 \overline{)36} \\ \underline{2} \\ 2 \overline{)18} \\ \underline{2} \\ 3 \overline{)9} \\ \underline{3} \\ 3 \end{array}$$

$2 \cdot 3 = 6$

$$x = \frac{3}{7} \pm \frac{6\sqrt{2}}{7}$$

You'll see something like this on EVERY TEST!

SOLVING
THE
EQUATION

Re-writing $f(x)$ as $a(x-h)^2 + k$:

MANIPULATING THE EXPRESSION

$$f(x) = 7x^2 - 6x - 9$$

$$\frac{f(x)}{7} = x^2 - \frac{6}{7}x - \frac{9}{7}$$

Adding & subtracting the $(\frac{3}{7})^2 = \frac{9}{49}$

$$= x^2 - \frac{6}{7}x + \left(\frac{3}{7}\right)^2 - \frac{9}{49} - \frac{9}{7} \cdot \frac{7}{7}$$

Bring the '7' back in: ^{7 TIMES:} $= (x - \frac{3}{7})^2 - \frac{72}{49}$

$$\Rightarrow f(x) = 7(x - \frac{3}{7})^2 - \frac{72}{49} \cdot 7$$

$$\frac{-9 - 63}{49} = -\frac{72}{49}$$

$$= 7(x - \frac{3}{7})^2 - \frac{72}{7} = f(x)$$

You'll see something like this on EVERY TEST!