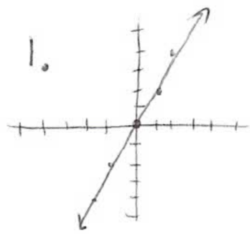
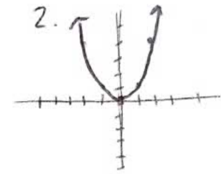
Day 8

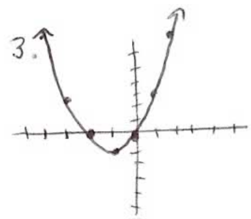
Thursday, September 07, 2017
12:06 PM

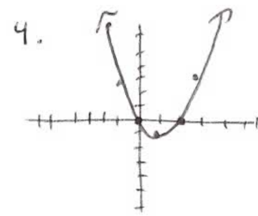
Plan

I. Warm-up: Toolkit Quiz
II. Go over HW
III. 1.6 Notes - Operations and Composition
IV. Start HW









After the quiz:

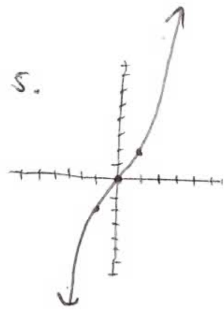
Draw the following graphs.

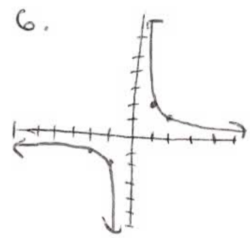
1. $\boldsymbol{f(x) = 2x}$ 2. $\boldsymbol{g(x) = x^2}$

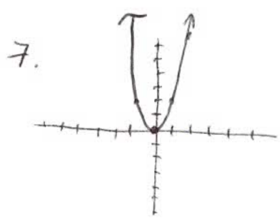
3. $f(x) + g(x)$ 4. $f(x) - g(x)$

5. $f(x) \cdot g(x)$ $= 2x^3$ 6. $\dfrac{f(x)}{g(x)}$ $= \dfrac{2}{x}$

7. $f(g(x))$ $= 2(x^2)$
$= 2x^2$







All functions are a composition of basic functions. Identify the parent function combined to form each complex function.

1. $f(x) = \sqrt{3x - 5}$ parent $= \sqrt{x}$

2. $g(x) = (\log x)^2$ parent $= x^2$

$\dfrac{(2x+3)(2x-3)}{x^3}$ x

3. $h(x) = \dfrac{4x^2 - 9}{x^3} + x$ parent =

The **composition** of function f with function g is defined by
$(f \circ g)(x) = f(g(x))$

EXAMPLE 2 Compose Two Functions

A. Given $f(x) = 2x^2 - 1$ and $g(x) = x + 3$, find $[f \circ g](x)$.

$2(x+3)^2-1$

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

$2(x^2+6x+9)-1$

$2x^2+12x+18-1$

$2x^2+12x+17$

B. Given $f(x) = 2x^2 - 1$ and $g(x) = x + 3$, find $[g \circ f](x)$.

$(2x^2-1)+3$

$2x^2+2$

C. Given $f(x) = 2x^2 - 1$ and $g(x) = x + 3$, find $[f \circ g](2)$.

$g(2) = (2)+3 = 5$

$f(5) = 2(5)^2-1 = 49$

Example 3a: State the domain of $f(x) = \frac{1}{x+1}$ and $g(x) = x^2 - 9$.

$x \neq -1$ $\qquad$ $\mathbb{R}$

Find $[f \circ g](x)$ and state it's domain.

$\frac{1}{(x^2-9)+1} = \frac{1}{x^2-8}$

$x^2-8 \neq 0$

$x^2 \neq 8$

$x \neq \pm 2\sqrt{2}$

$\{x \mid x \neq \pm 2\sqrt{2}, x \in \mathbb{R}\}$

Example 3b: State the domain of $f(x) = x^2 - 2$ and $g(x) = \sqrt{x-3}$.

$\mathbb{R}$ $\qquad$ $x-3 \geq 0$, $x \geq 3$

Find $[f \circ g](x)$ and state it's domain.

check domain here to see if there are issues.

$(\sqrt{x-3})^2-2$

$x-3-2$

$x-5$

domain: $x \geq 3$

EXAMPLE 4 Decompose a Composite Function

A. Find two functions *f* and *g* such that $h(x) = [f \circ g](x)$ **when** $h(x) = \frac{1}{(x+2)^2}$. **Neither function may be the identity function** $f(x) = x$.

$f(x) = \frac{1}{x^2}$ $g(x) = x + 2$

B. Find two functions *f* and *g* such that $h(x) = [f \circ g](x)$ **when** $h(x) = 3x^2 - 12x + 12$. **Neither function may be the identity function** $f(x) = x$.

$h(x) = 3(x^2 - 4x + 4)$

$f(x) = 3x$ $g(x) = x^2 - 4x + 4$