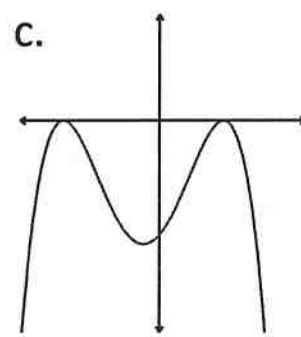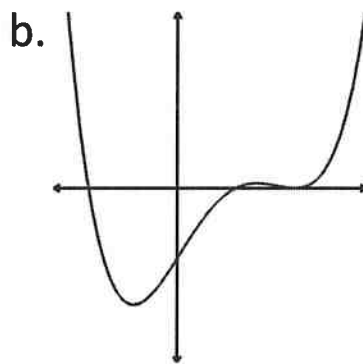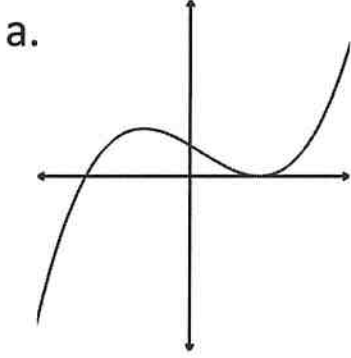IB Math 1

Warm Up

Evaluate and simplify if $h(x) = (x-2)^2 + 7$ and $p(x) = 4 - 2x$

1. $h(4a)$　　　　2. $p(a-5)$　　　　3. $h(p(2))$

4. Do these polynomials have even or odd degree?

a.

b.

c.

Answers

1. $h(4a) = (4a-2)^2 + 7$

$= 16a^2 - 16a + 4 + 7$

$= 16a^2 - 16a + 11$

2. $p(a-5) = 4 - 2(a-5)$

$= 4 - 2a + 10$

$= 14 - 2a$

3. $h(p(2)) = h(0) = (0-2)^2 + 7$

$= 4 + 7$

$= \boxed{11}$

$p(2) = 4 - 2(2)$

$= 4 - 4$

$= 0$

4. a. odd degree

b. even degree

c. even degree

2D Composition of Functions

$f(x) = x^2 + 3x - 5$ and $g(x) = x - 2$

5. Find $f \circ g(x)$

$f(g(x))$

$f(x-2)$

$(x-2)^2 + 3(x-2) - 5$

$x^2 - 4x + 4 + 3x - 6 - 5$

$f \circ g(x) = x^2 - x - 7$

6. Find $f\left(g\left(g\left(f\left(f(1)\right)\right)\right)\right)$

$f(1) = (1)^2 + 3(1) - 5$
$= -1$

$f(-1) = (-1)^2 + 3(-1) - 5$
$= 1 \quad -3 \quad -5$
$= -7$

$g(-7) = -7 - 2$
$= -9$

$g(-9) = -9 - 2$
$= -11$

$f(g(g(f(-1))))$

$f(g(g(-7)))$

$f(g(-9))$

$f(-11)$

$(-11)^2 + 3(-11) - 5$

$121 \quad -33 \quad -5$

$88 - 5$

$\boxed{83}$

The domain of a composition may be restricted by the "inside" function.

7. Write the domain for $f \circ g(x)$ if $f(x) = x^2$ and $g(x) = \sqrt{x-1}$.

$g(x) = \sqrt{x-1}$

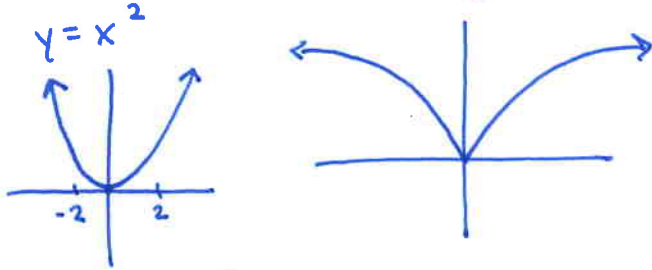$D: [1, \infty)$

$f(g(x))$

$f(\sqrt{x-1})$

$(\sqrt{x-1})^2$

$x - 1$

The domain is **not** all real numbers because we must first consider the domain for $g(x)$
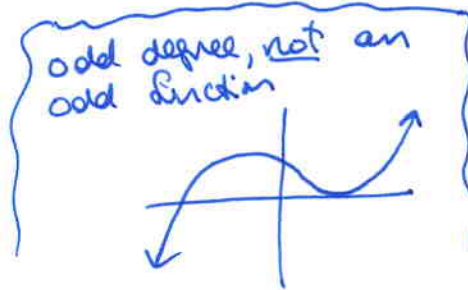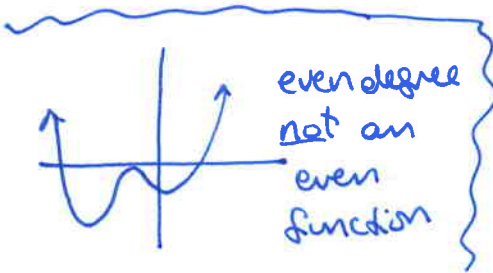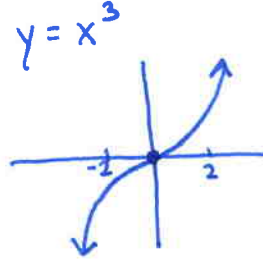
$\therefore$ The domain for $f \circ g(x)$ is $[1, \infty)$

2E Even and Odd Functions

Even Functions have reflection symmetry about the __y - axis__.

Odd Functions have rotational symmetry about the __origin__.

$y = x^2$

$y = x^3$

even degree
not an
even
function

odd degree, not an
odd function

Test for even and odd functions: Simplify $f(-x)$ and compare with $f(x)$.

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

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

$$f(-x) = \frac{\text{something}}{\text{else}}$$
__Neither__

Is the function even, odd, or neither?

8. $k(x) = \dfrac{4}{x-3}$

$$k(-x) = \frac{4}{-x-3}$$

$$\overset{?}{=} k(x) \qquad \overset{?}{=} -k(x)$$

No! $\qquad = \dfrac{-4}{x-3}$ No!

Neither

9. $m(x) = \dfrac{x}{x^2 - 1}$

$$m(-x) = \frac{-x}{(-x)^2 - 1}$$

$$= -\frac{x}{x^2 - 1}$$

$$= m(x) \quad No!$$

$$= -m(x)$$

$$= -\frac{x}{x^2-1} \quad Yes!$$

$m(x)$ is ODD

Hw 2D (1-8)
2E (1-3)