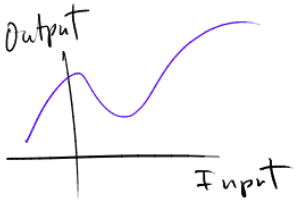
Wednesday - functions

1. Functions = Machines

pass vertical line test
- @ each input, there's only one output.



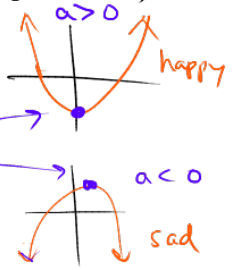
2. Examples $f(x) = ax + b$ graphs are lines (linear function)

$f(x) = ax^2 + bx + c$ quadratic function

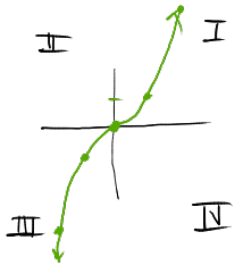
$= a(x-h)^2 + k$

degree = 2
"highest exponent"

vertex = (h,k)



$f(x) = x^3$ →



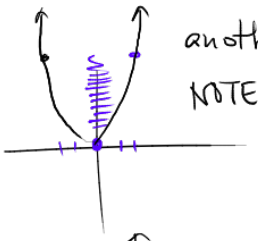
$f(x) = (x-a)^3$

Note! a is +/- on inside.

gives horizontal shift of the function $f(x) = x^3$ to right

$g(x) = (x+a)^3$ shift left. a units

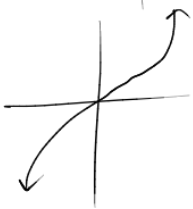
$f(x) = x^4$



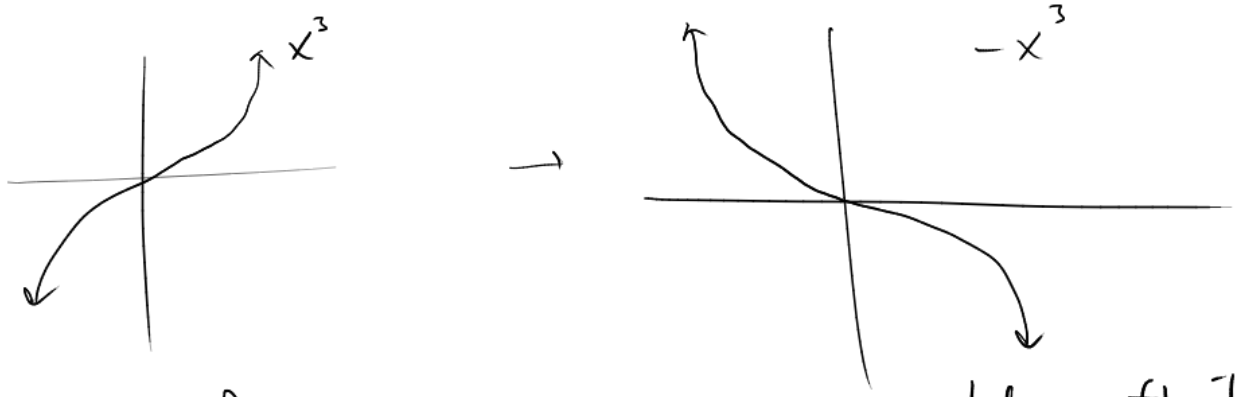
another happy

NOTE: exponent is even, get parabol(shape

$f(x) = x^5$



To flip graphs we multiply on outside by -1.



Note: $c \cdot f(x)$ if $c = -1$ is horizontal reflection

$c \cdot f(x)$ is vertical stretch if $c > 1$

vertical shrink if $0 < c < 1$

$$f(x) = x^2 + 4$$

$$f(0) = 4$$

$$f(-1) = 5$$

$$f(\text{Taco}) = \text{Taco}^2 + 4$$

whatever's b/w

$f(f(t))$ $f(t)=t^2+4$

1. **(1 point)** Library/Michigan/Chap1Sec3/Q15.pg
If $f(x)=x^2+4$, find and simplify the following:

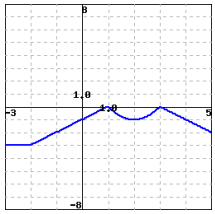
(a) $f(t+4)=$ $(t+4)^2+4 = t^2+8t+20$
(b) $f(t^5+4)=$ $(t^5+4)^2+4$
(c) $f(5)=$ $5^2+4 = 29$
(d) $5f(t)=$ $5[t^2+4] = 5t^2+20$
(e) $(\quad)^2+4=$ $(t^2+4)^2+4$

Answer(s) submitted:

- b
-
-
-
- t^4 + 8t^2 + 20

(score 0.20000000298023224)

2. **(1 point)** Library/Michigan/Chap1Sec3/Q05.pg



The figure above is the graph of the function $m(t)$. Let $n(t)=m(t)+2$, $k(t)=m(t+1.5)$,$w(t)=m(t-0.5)-2.5$ and $p(t)=m(t-1)$. Find the values of the following:

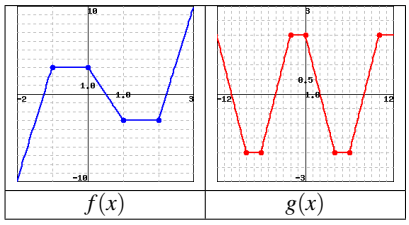
1. $n(-3)=$ _____.
2. $n(2)=$ _____.
3. $k(2.5)=$ _____.
4. $w(3.5)=$ _____.
5. $w(-0.5)=$ _____.
6. $p(1.5)=$ _____.

Answer(s) submitted:

- -3 + 2
- -1 + 2
- -1
- -2.5
- -2 - 2.5
- -.5

(correct)

3. **(1 point)** Library/Michigan/Chap1Sec3/Q43.pg



$f(x)$ $g(x)$

Use the figures above, which show the functions $f(x)$ and $g(x)$, to find the following values. Note that you can find exact values.

-2 ← initial input, goes into g

1. $f(g(-2))=$ -10
2. $g(f(0))=$ -2
3. $g(g(1))=$ _____

Answer(s) submitted:

- -10
-
-

(score 0.333333333333333)

4. **(1 point)** Library/Utah/AP_Calculus_I/set1_Reviews_of_Fundamentals/1210s2p18.pg

Let $f(x)=x^2+\sin x$ and let $g(x)=$ _____ where g is the function whose graph has been obtained from that of f by shifting it 5 to the right and 9 up.

Answer(s) submitted:

- (x-5)^2 + sin(x-5) + 9

(correct)

5. **(1 point)** Library/Utah/AP_Calculus_I/set1_Reviews_of_Fundamentals/1210s2p4.pg
This problem concerns even and odd functions. Recall that a function f is *even* if

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

for all x in its domain, and it is *odd* if

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

for all x in its domain. The graph of an even functions is symmetric with respect to the y-axis, and an odd function is symmetric with respect to the origin. This is an example of one of our major themes: the interplay between algebra and geometry.

For each of the following functions enter "E" to indicate that the function is even, "O" to indicate it is odd, and "N" to indicate that is neither even nor odd.

___1. $f(x)=x^{-6}$
___2. $f(x)=x^8-6x^6+3x^4$

Ex. $f(x) = x^2 + 2x - 1$

$f(3) = 3^2 + 2\cdot 3 - 1 = 9 + 6 - 1 = 14$

$f(x+1) = (x+1)^2 + 2(x+1) - 1 = x^2 + 2x + 1 + 2x + 2 - 1$

$= x^2 + 4x + 2$

$f(x+h) = (x+h)^2 + 2(x+h) - 1 = x^2 + 2xh + h^2 + 2x + 2h - 1$

Ex. $g(x) = \dfrac{1+x}{x-1}$

$$g\left(\frac{1}{x}\right) = \frac{1 + \frac{1}{x}}{\frac{1}{x} - 1} = \frac{\frac{x}{x} + \frac{1}{x}}{\frac{1}{x} - \frac{x}{x}} = \frac{\frac{x+1}{x}}{\frac{1-x}{x}} = \frac{x+1}{x} \cdot \frac{x}{1-x} = \frac{x+1}{1-x}$$

can you simplify this?