# Warm-up

Categorize the following numbers:

33 5 9 82 42 21

2 27 7 69 74 13

110 -97 77 666 11

-119 0 1993 1996 -10

# Functions can also be even or odd, but how can we tell?

# Odd or Even?

- $f(x) = 5x^4 + x^2$
- $f(x) = x^6 - 2x^4 + 5x^2$
- $f(x) = 6x^2 - 3$
  $= 6x^2 - 3x^0$

$x^0 = 1$

- $f(x) = x^3 - 2x^1$
- $f(x) = 6x^5 + 7x^3 - x^1$
- $f(x) = 14x^3 + 5x^1$

- $f(x) = x^3 + 4x^1 + 1$
- $f(x) = 3x^4 + x^2 - 9x^1$
- $f(x) = 10x^5 + x^3 - 3x^2 + 6$

# Algebraically

## A function is even if

All of the exponents of the variable are even.

## A function is odd if

All of the exponents of the variable are odd.

## A function is neither if

The exponents are a mixture of odd and even


# BEWARE OF CONSTANTS

**All constants really have a $x^0$**


$x^0$ is
EVEN!!

# Even, Odd or Neither?

1. $f(x) = 3x^{4} - 9x^{2} - 15$ even

2. $f(x) = 15x^{15} - 9x^{7} - 8x^{3}$ odd

3. $f(x) = 8x^{5} - 7x^{4} + 9$ neither

4. $f(x) = 5$ even
   $= 5x^{0}$

5. $f(x) = 8x^{20} + 6x^{14} - 4x^{2} + 3$ even

# Graphically

## A function is even if

**The graph reflects across the y-axis**

*(Means you can fold it hotdog style and it would match up).*

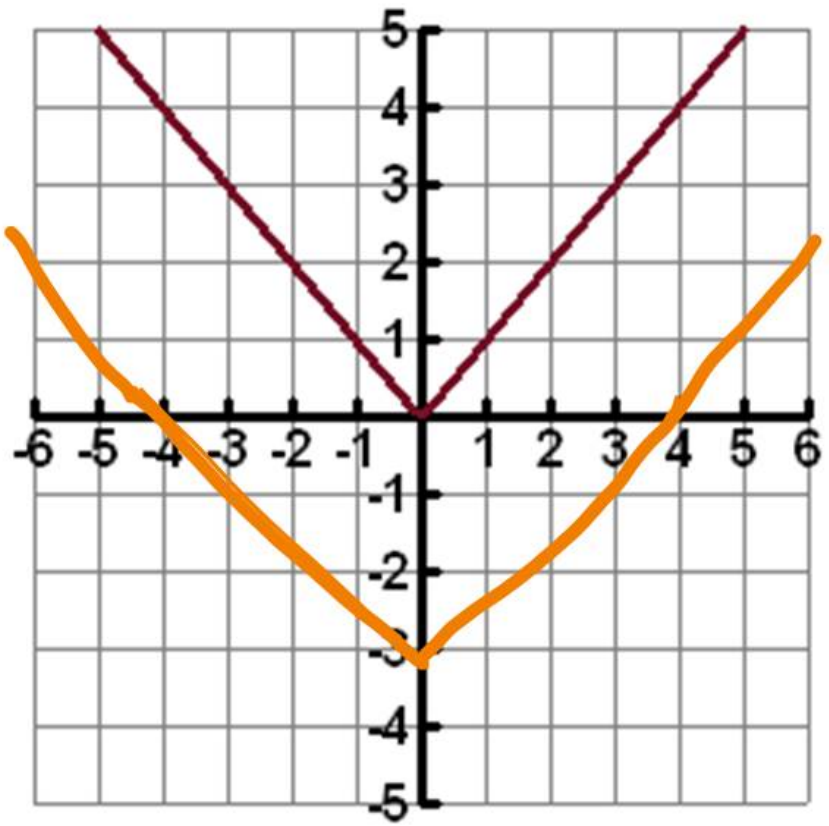
## A function is odd if

**The graph has 180° rotational symmetry about the ORIGIN**

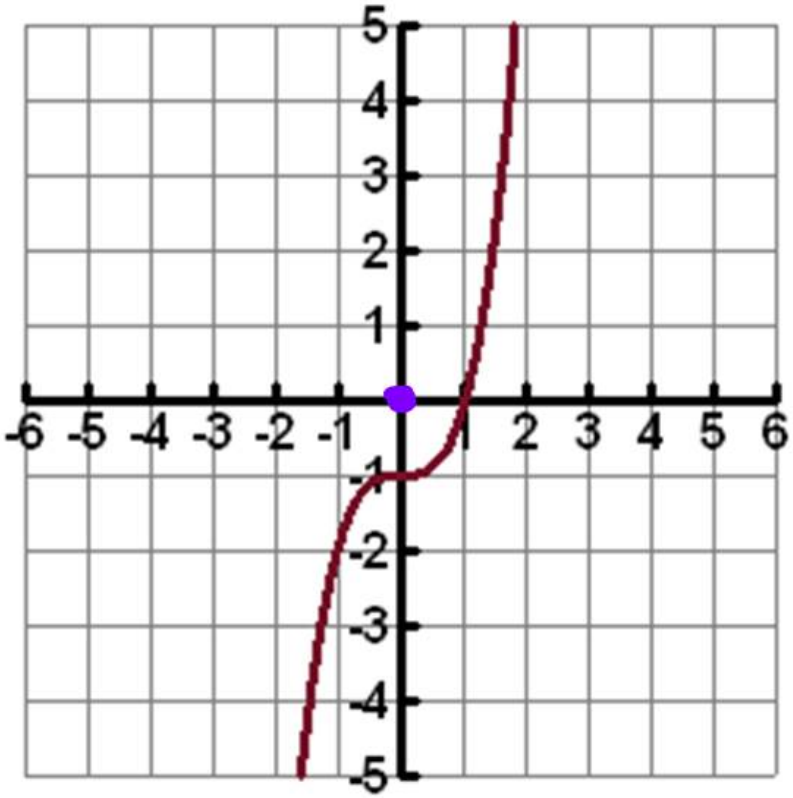
*(Means you could turn it upside-down & it would still look the same. The graph must go through the origin!!!)*

# Even, Odd or Neither?

Even

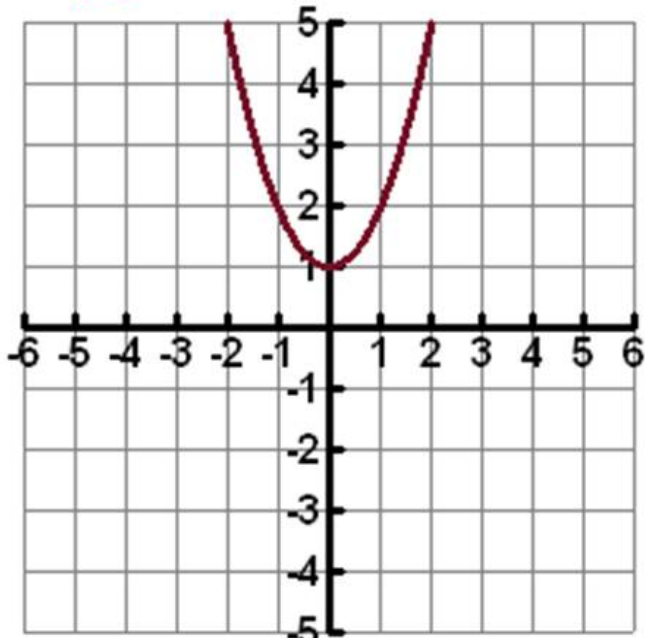


# Even, Odd or Neither?

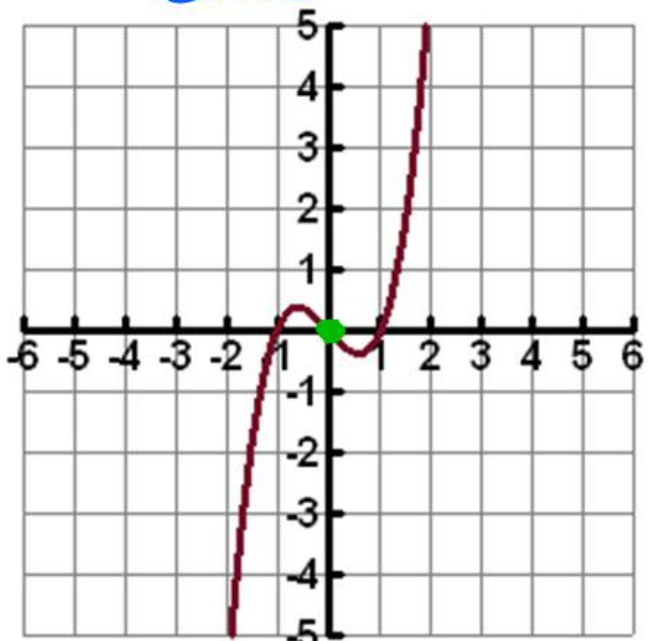


# Even, Odd or Neither?

Even

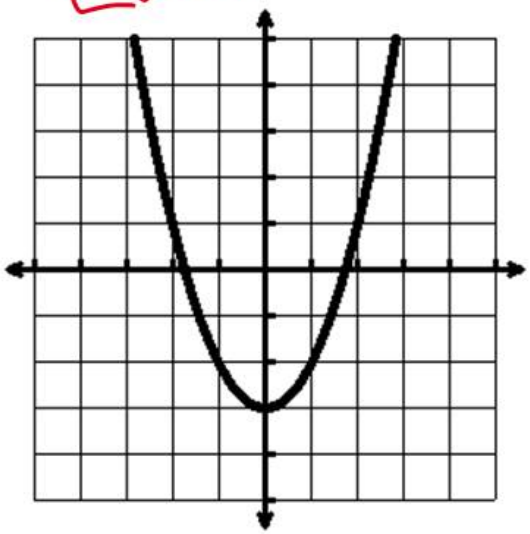



Odd

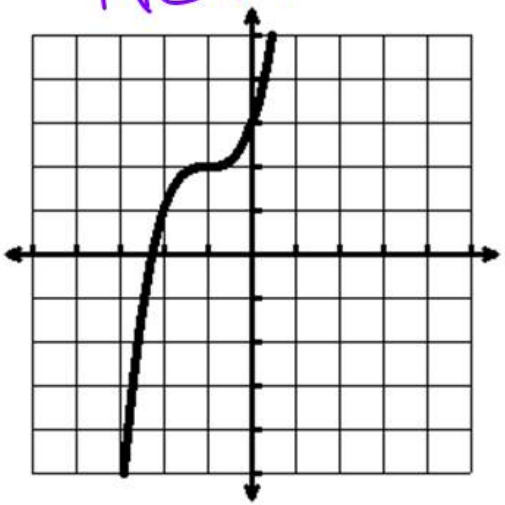


# Even, Odd or Neither?

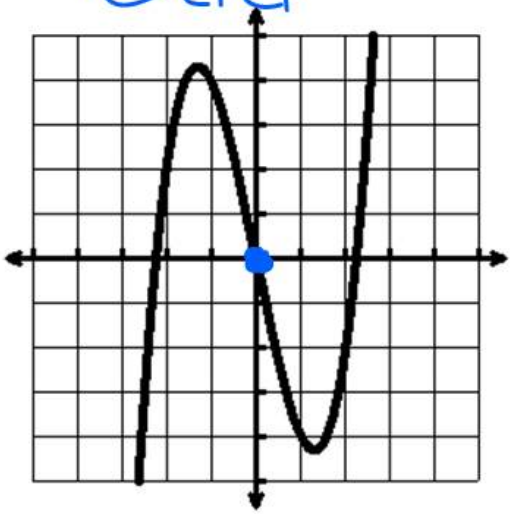
Even



Neither



Odd



# Practice *continued*

**Tell whether the function is *even*, *odd*, or *neither*.**

**10.** $f(x) = 5x^3$

**11.** $f(x) = x^2 - 5$

**12.** $f(x) = x^3 - 2x^2$

**13.** $f(x) = -x^3 + x + 8$

**14.** $f(x) = x^4 - 3x^2$

**15.** $f(x) = x^3 + 8x$