Curve Sketching

Intercepts:

To find the *x* - intercept of *y = f(x),* set *y = 0* and solve for *x.*

To find the y - intercept of *y = f(x),* set *x = 0;* the *y* - intercept is *f(0).*

Example: $y = \dfrac{x^2 - x - 6}{x + 1}$

x-int (y=0)

$(x+1)\ 0 = \dfrac{x^2-x-6}{x+1} \cdot (x+1)$

$0 = x^2 - x - 6$ factor $2 \cdot -3 = -6$, $2 + -3 = -1$

$0 = (x+2)(x-3)$

$x+2=0$ | $x-3=0$

$x=-2$ | $x=3$

(-2,0) (3,0)

y-int (x=0)

$y = \dfrac{(0)^2-(0)-6}{(0)+1}$

$y = \dfrac{-6}{1} = -6$

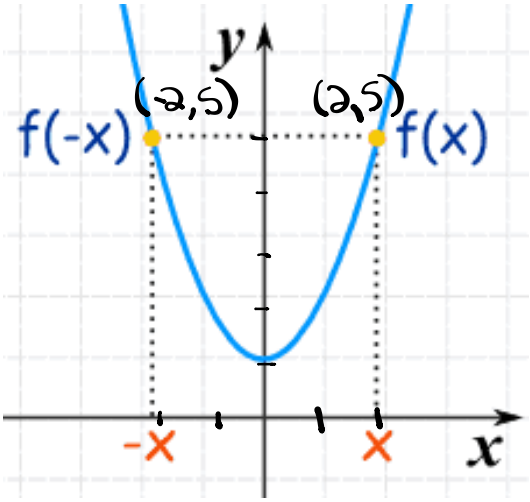
(0,-6)

Symmetry:

An even function satisfies

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

for all *x* in its domain. Thus, a function is even if it is unchanged when *x* is replaced by *-x.* The graph of an even function is symmetric about the *y-axis.*

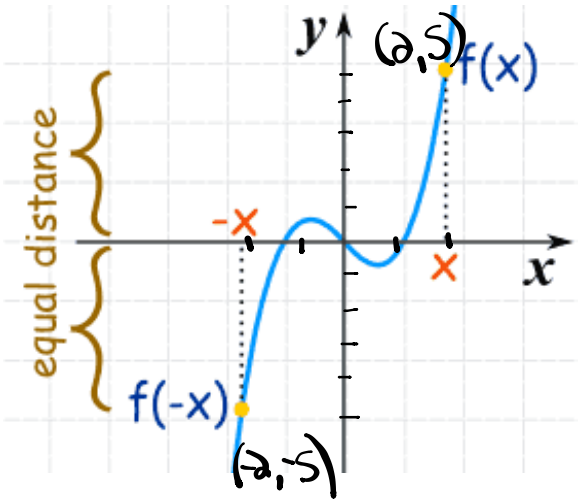


$f(2) = 5$
$f(-2) = 5$
$\Big\} \; f(-x) = f(x)$

An odd function satisfies

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

for all x in its domain. The graph of an odd function is symmetric about the *origin*. (0,0)



$f(a) = 5$
$f(-a) = -5$
$\Big\} f(-x) = -f(x)$

Symmetry is used to reduce the amount of work in graphing. If we have graphed an *even function* for $x \geq 0$, we just reflect in the *y-axis* to get the entire graph. For an *odd function* we just rotate through 180 degrees about the origin.

Example: Test: replace x with (-x)
Determine whether each function is even, odd, or neither

a) $f(x) = x^6$

$f(-x) = (-x)^6$

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

$f(-x) = x^6$

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

b) $g(x) = x^3 + \frac{1}{x}$

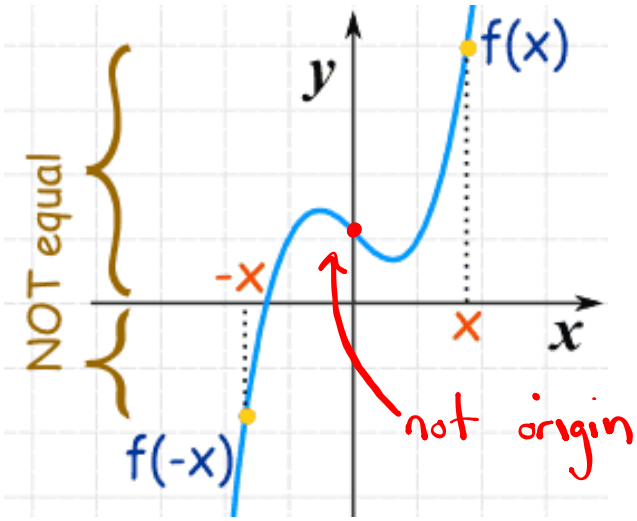
$g(-x) = (-x)^3 + \frac{1}{(-x)}$

$g(-x) = -x^3 - \frac{1}{x}$

$g(-x) = -\left(x^3 + \frac{1}{x}\right)$

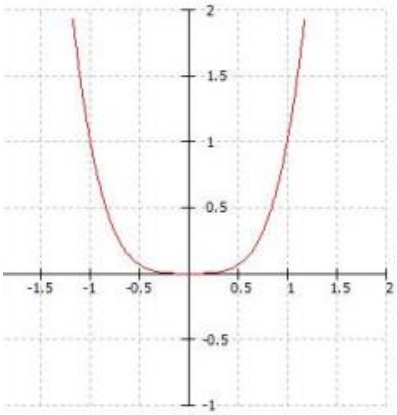
$g(-x) = -g(x)$ (odd)

Is this function Even of Odd? Neither

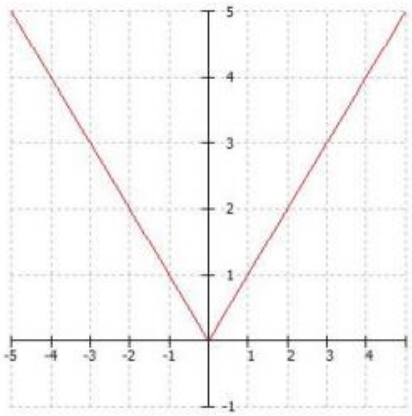


Homework

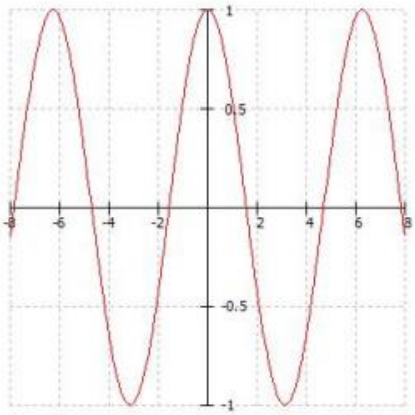
Even Functions



$f(x) = x^4$



$g(x)=|x|$



$h(x) = \cos x$