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:

$$y = \frac{x^2 - x - 6}{x + 1}$$

x-intercept (y=0)

$\frac{0}{1} = \frac{x^2-x-6}{x+1}$

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

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

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

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

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

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

$(3,0)$ | $(-2,0)$

y intercept (x=0)

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

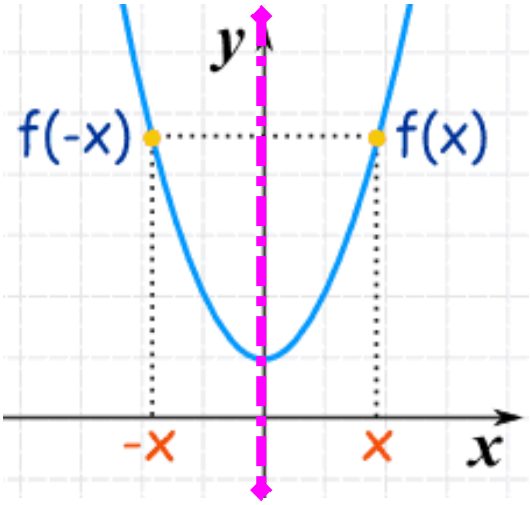
$(0,-6)$

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*.



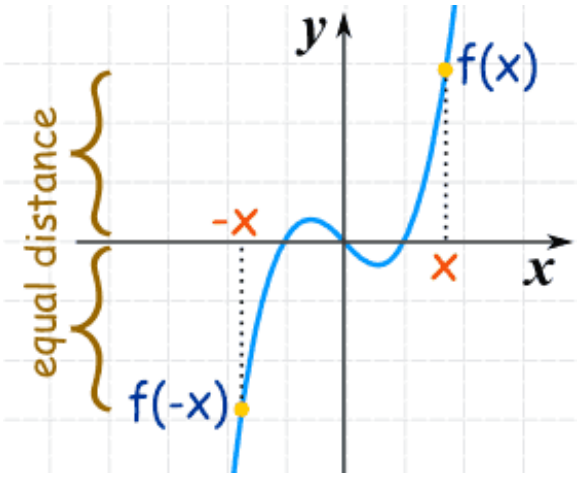
$f(1.75) = 4.5$

$f(-1.75) = 4.5$

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*.



$f(1.75) = 3$

$f(-1.75) = -3$

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:

Determine whether each function is even, odd, or neither

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

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

$f(-x) = x^6$

Since: $f(-x) = f(x)$

Even

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

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

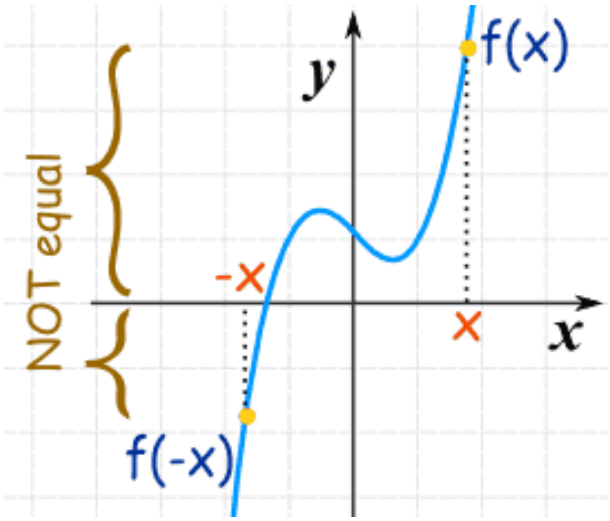
$g(-x) = -x^3 - \frac{1}{x}$

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

Since: $g(-x) = -g(x)$

Odd

Is this function Even of Odd? (Neither)

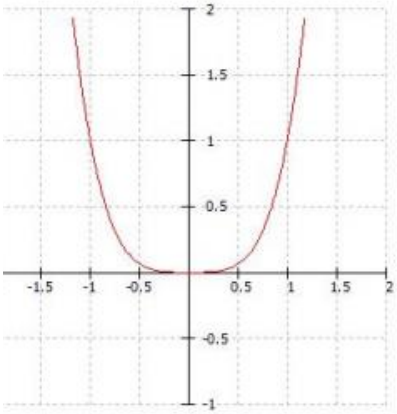


$f(1.75)=4$

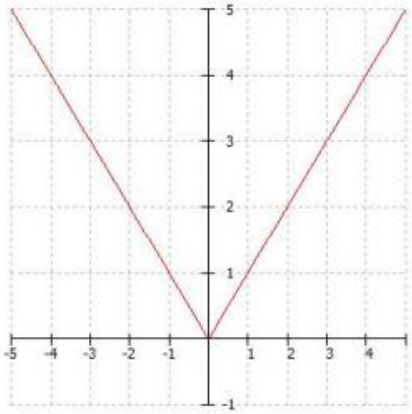
$f(-1.75)=-1.75$

Homework

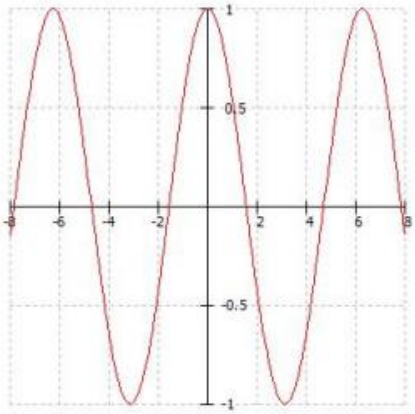
Even Functions



$f(x) = x^4$



$g(x)=|x|$



$h(x) = \cos x$