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

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

$$x^2-x-6=0$$

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

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

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

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

y intercept

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

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

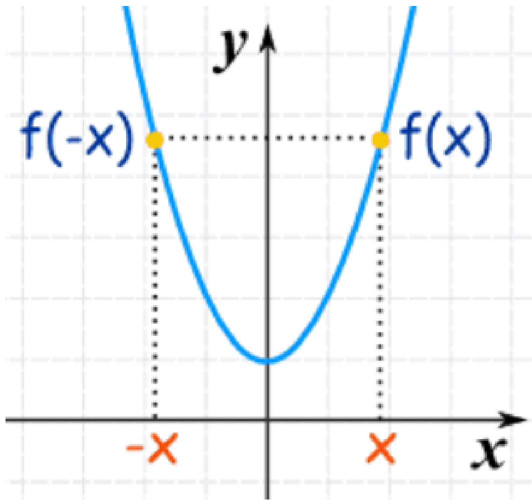
$(0,-6)$

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.*



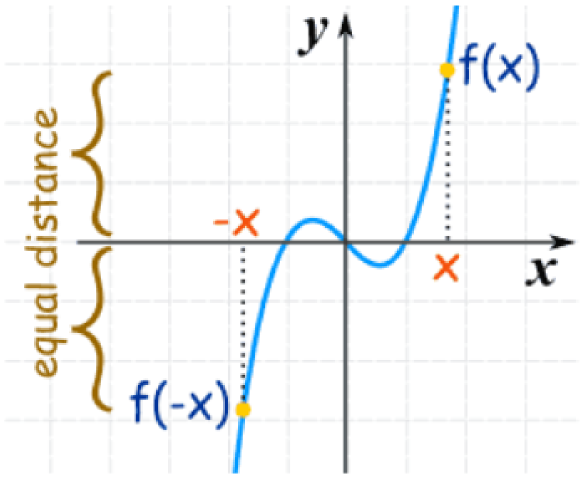
$F(1.75) = 4.5$

$F(-1.75) = 4.5$

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) $f(x) = x^6$

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

$= x^6$

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

Even

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

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

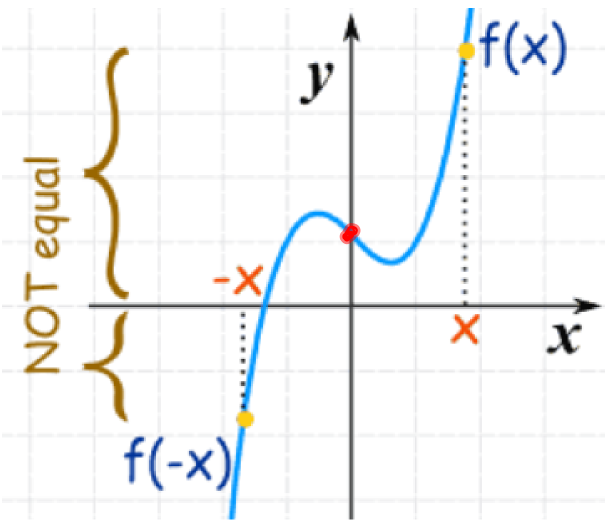
$= -x^3 - \dfrac{1}{x}$

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

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

Odd

Is this function Even of Odd?



Neither

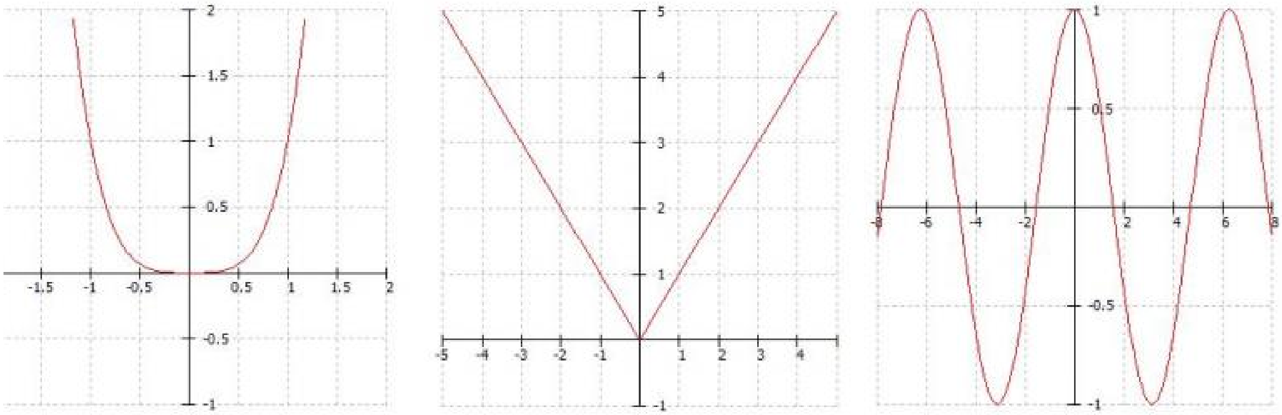
$f(1.75) = 4$

$f(-1.75) = -1.8$

$\therefore$ $\boxed{\begin{array}{l} f(-x) \neq -f(x) \\ \text{or } f(-x) \neq f(x) \end{array}}$

Homework

Even Functions



$f(x) = x^4$ | $g(x)=|x|$ | $h(x) = \cos x$