Symmetry with Respect to the x-axis

Algebraic interpretation: Replacing y by –y results in an equivalent equation.

Graphical interpretation: x-axis acts as a mirror.

Symmetry with Respect to the y-axis

Algebraic interpretation: Replacing x by –x results in an equivalent equation.

Graphical interpretation: y-axis acts as a mirror.

Symmetry with Respect to the Origin

Algebraic interpretation: Replacing x by –x and y by –y results in an equivalent equation.

Graphical interpretation: If (a,b) is a point on the graph, then (–a,–b) is also a point on the graph.

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$x^2y^2 + xy = 2$

Symmetry with Respect to the x-axis:

Symmetry with Respect to the y-axis:

Symmetry with Respect to the Origin:

Even Function

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

Note: If the graph of a function is symmetric with respect to the **y**-axis, then the function is **e**ven.

Odd Function

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

Note: If the graph of a function is symmetric with respect to the **o**rigin, then the function is **o**dd.

I recommend using the acronym YEOO to help you remember the relationship between symmetry and even/odd functions.

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

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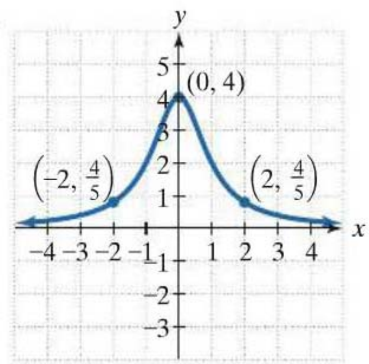

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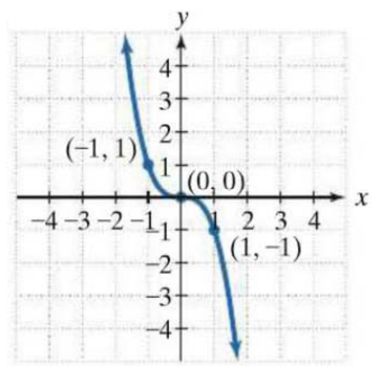

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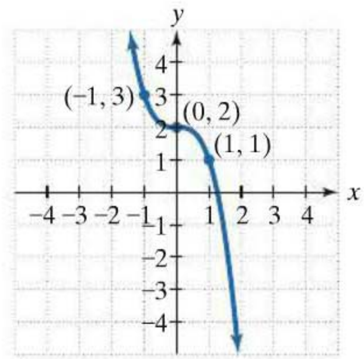

Piecewise Function

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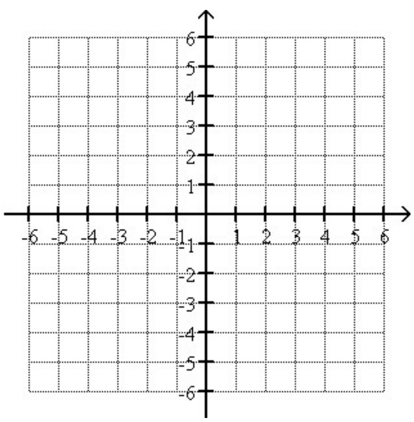
$$f(x) = \begin{cases} 6x - 1 & x < 0 \\ 7x + 3 & x \geq 0 \end{cases}.$$

(a) $f(-3)$ (b) $f(0)$ (c) $f(4)$

Example: Graph the following function and find the range.

$$f(x) = \begin{cases} 2 & x < 1 \\ -x + 3 & x \geq 1 \end{cases}.$$



Difference Quotient: $\frac{f(x+h) - f(x)}{h}$, $h \neq 0$

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$f(x) = -3x^2 + 2x - 1$