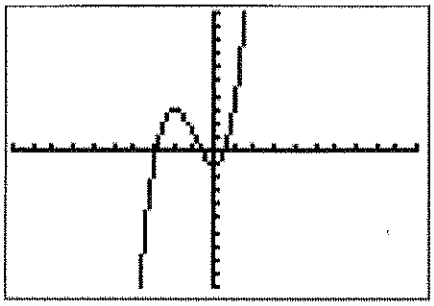
END BEHAVIOR **DATE:_____**

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

Degree:_____ Even/Odd



As x gets big negative (left side) the graph goes _____

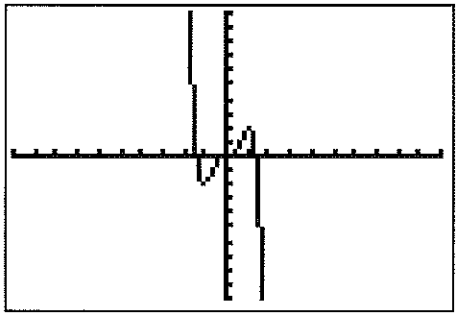
As x-> -∞ f(x)->_____

As x gets big positive (right side) the graph goes_____

As x-> ∞ f(x)->_____

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

Degree:_____ Even/Odd



As x gets big negative (left side) the graph goes _____

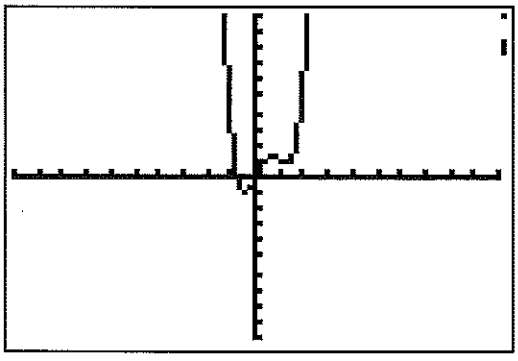
As x-> -∞ f(x)->_____

As x gets big positive (right side) the graph goes_____

As x-> ∞ f(x)->_____

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

Degree:_____ Even/Odd



As x gets big negative (left side) the graph goes _____

As x-> -∞ f(x)->_____

As x gets big positive (right side) the graph goes_____

As x-> ∞ f(x)->_____

NAME _____ DATE _____ PERIOD _____

9-3 Enrichment

Graphing Polynomial Functions

A **polynomial function** is a continuous function that can be described by a polynomial equation in one variable.

Polynomial Function

If n is a nonnegative integer, $a_0, a_1, a_2, \ldots, a_{n-1}, a_n$ are real numbers, and $a_n \neq 0$, then

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_2 x^2 + a_1 x + a_0$$

is a polynomial function of degree n.

Notice that a quadratic function is a polynomial function of degree 2.

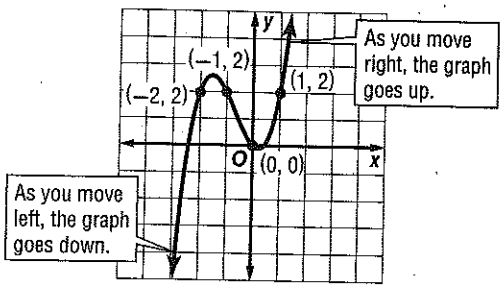
Example **Create a table of values and a graph for $y = x^3 + 2x^2 - x$. Then describe its end behavior.**

Create a table of values, and graph the ordered pairs. Connect the points with a smooth curve. Find and plot additional points to better approximate the curve's shape.

x	$x^3 + 2x^2 - x$	y
-4	$(-4)^3 + 2(-4)^2 - (-4)$	-28
-3	$(-3)^3 + 2(-3)^2 - (-3)$	-6
-2	$(-2)^3 + 2(-2)^2 - (-2)$	2
-1	$(-1)^3 + 2(-1)^2 - (-1)$	2
0	$(0)^3 + 2(0)^2 - 0$	0
1	$1^3 + 2(1)^2 - 1$	2
2	$2^3 + 2(2)^2 - 2$	14
3	$3^3 + 2(3)^2 - 3$	42

As x decreases, y decreases

As x increases, y increases.



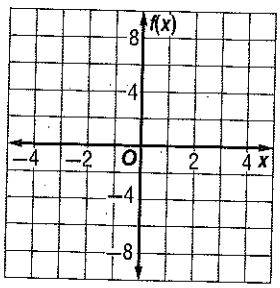
From the table and the graph we see that as x decreases, y decreases and as x increases, y increases.

Exercises

Create a table of values and a graph for each function. Then describe its end behavior.

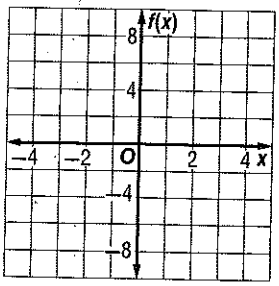
1. $f(x) = x^3 + 3x^2 - 1$

x	$f(x)$
-4	
-3	
-2	
-1	
0	
1	



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

x	$f(x)$
-2	
-1	
-0.5	
0	
0.5	
1	
2	



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

x	$f(x)$
-2	
-1	
-0.5	
0	
0.5	
1	
2