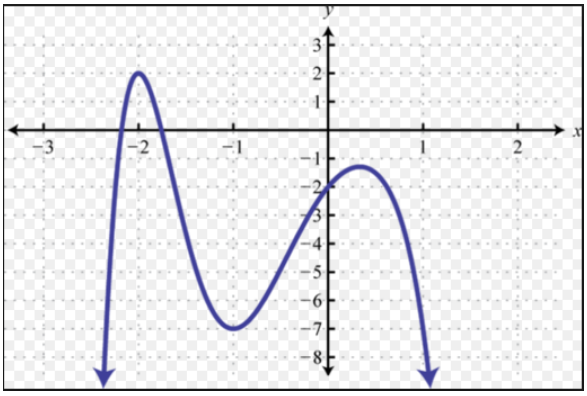
5-1 Polynomial Functions (Smooth Curves)



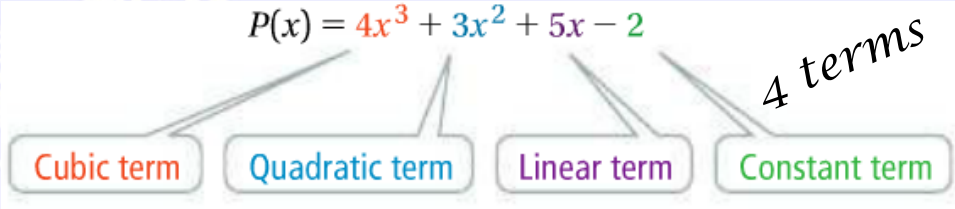
A. Categorizing --> Put in standard form 1st (exponents decending) example:

$$y = x^4 + x^3 + x^2 + x + 1$$

1. Degree (Largest Exponent)

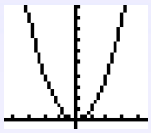
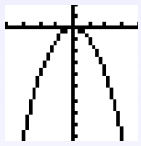
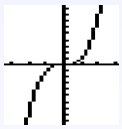
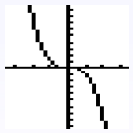
0 --> constant
1 --> linear
2 --> quadratic
3 --> cubic
4 --> quartic
5 --> quintic
6 --> 6th degree...

2. Terms (seperated by "+" and "-" signs)



1 term = monomial
2 terms = binomial
3 terms = trinomial
4 terms = 4 terms ...

B. End Behavior (Focus on the term with the largest exponent.)

		End Behavior
$+ x^{even}$		(↖,↗)
$- x^{even}$		(↙,↘)
$+ x^{odd}$		(↙,↗)
$- x^{odd}$		(↖,↘)

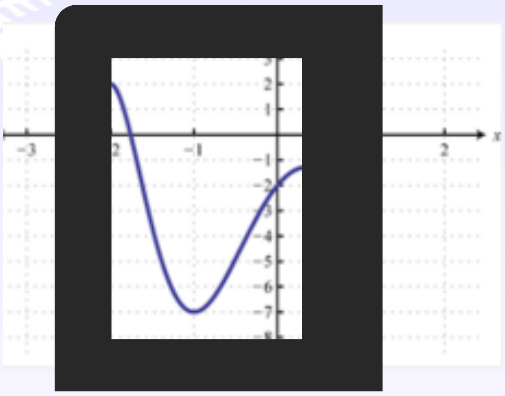
C. Turning Points - places where the graph changes direction.

A polynomial of n^{th} degree can have at most n - 1 turning points.

4 -1 = 3, so this has at most 3 turning points.

$$y = -2x^4 + 8x^3 - 8x^2 + 2$$

Why is end behavior important?



D. Examples: Put the polynomial in standard form and describe its degree, term, end behavior and turning points.

#1 $y = 4 + x^2 - 3x - x$

Standard Form:
Degree:
Term:
End Behavior:
At Most _____ Turning Points

#2 $y = -5x^3 + x^2 - 4x + x^3 + 4x$

Standard Form:
Degree:
Term:
End Behavior:
At Most _____ Turning Points

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Write each polynomial in standard form. Then classify it by degree and by number of terms. See Problem

8. $7x + 3x + 5$	**9.** $5 - 3x$	**10.** $2m^2 - 3 + 7m$
11. $-x^3 + x^4 + x$	**12.** $-4p + 3p + 2p^2$	**13.** $5a^2 + 3a^3 + 1$
14. $-x^5$	**15.** $3 + 12x^4$	**16.** $6x^3 - x^3$
17. $7x^3 - 10x^3 + x^3$	**18.** $4x + 5x^2 + 8$	**19.** $x^2 - x^4 + 2x^2$

Determine the end behavior of the graph of each polynomial function. See Problem

20. $y = -7x^3 + 8x^2 + x$	**21.** $y = -3x + 6x^2 - 1$	**22.** $y = 1 - 4x - 6x^3 - 15x^6$
23. $y = 8x^{11} - 2x^9 + 3x^6 + 4$	**24.** $y = -x^5 - 15x^7 - 4x^9$	**25.** $y = -3 - 6x^5 - 9x^8$
26. $y = x^4 - 7x^2 + 3$	**27.** $y = -8x^7 + 16x^6 + 9$	**28.** $y = -14x^6 + 11x^5 - 11$
29. $y = -x^3 - x^2 + 3$	**30.** $y = x^3 - 14x - 4$	**31.** $y = 5 - 17x^7 + 9x^{10}$