

# 1.6 Graphing Polynomials

Day 8

4/02/15

Apr 2-7:14 AM

**End behavior :**

the end behavior describes the graph at the far left and at the far right.

**Turning Point :**

where the graph changes direction

These are determined by the degree of the polynomial

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If the degree is odd:

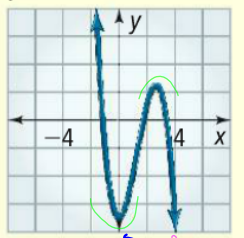
even number of turning points

$a > 0$ , ends down then up

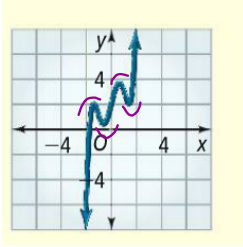
$a < 0$ , ends up then down

EXAMPLES:

$$y = -x^3 + 4x^2 - 7$$



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



turning point

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If the degree is even:

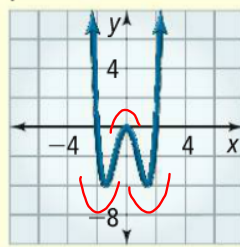
odd number of turning points

$a > 0$ , both ends up

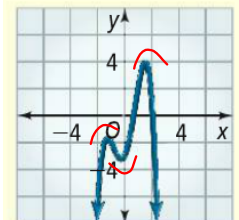
$a < 0$ , both ends down

EXAMPLES:

$$y = x^4 - 4x^2$$



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



Apr 2-7:25 AM

Describe the end behavior:

$y = 4x^3 - 3x$

- 2 turning points
- end points: up, then down

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

end behavior → turning point

3 turning points  
both end down

Apr 2-8:17 AM

$f(x) = -x^3 + 4x^2 - 3x - 10$

degree: odd

lead coeff: neg

end behavior: up then down

turning points: two

Apr 6-8:22 AM

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

degree: even

lead coeff: positive

end direction:  
both ends up

turning points: 3 turning points

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Graphing functions:

Step 1: make a table

Step 2: solve for y or f(x)

Step 3: plot points

Apr 2-8:19 AM

What is the graph below? Describe the graph, including end behavior and turning points.

$$y = 3x - x^3$$

Apr 2-8:22 AM

Degree Sign of Leading Coefficient	Even	Odd
Positive (+) $x^4 + 3x^2 + 1$ Examples: $(x+3)^3(x+2)$ $(3-x)^4(x+2)$	$-x^4 + 3x^2 + 1$ Examples: $-(x+3)^3(x+2)$ $x(3-x)^3(x+2)^2$	$x^3 + 3x^2 + 1$ Examples: $(x+3)^3(x+2)^2$ $x(3-x)^3(x+2)$
Negative (-)	$-x^4 + 3x^2 + 1$ Examples: $-(x+3)^3(x+2)$ $(3-x)^3(x+2)$	$x^3 + 3x^2 + 1$ Examples: $(x+3)^3(x+2)^2$ $x(3-x)^3(x+2)$

#22-30

Apr 6-7:21 AM

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

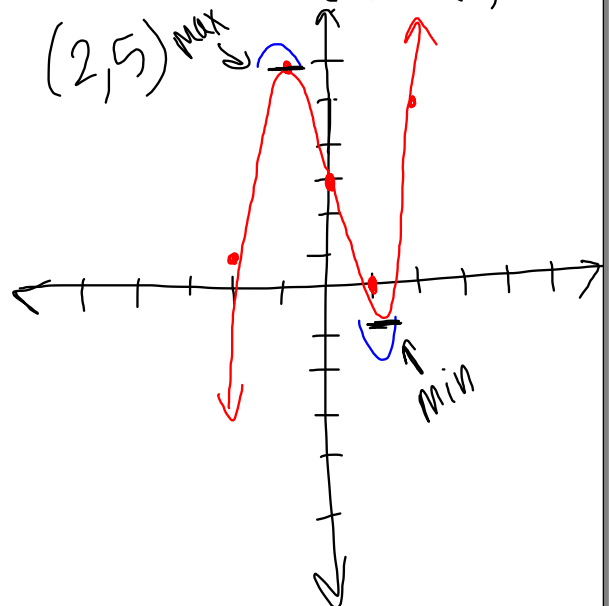
X	"set up"	Y
-2	$(-2)^3 + (-2)^2 - 5(-2) + 3$	1
-1	$(-1)^3 + (-1)^2 - 5(-1) + 3$	6
0	$0 + 3$	3
1		0
2		5

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$$(-2^3) + (-2^2) - (5(-2)) + 3$$

$$(-2, 1) (-1, 6) (0, 3) (1, 0)$$

$$(2, 5) \text{ Max}$$



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

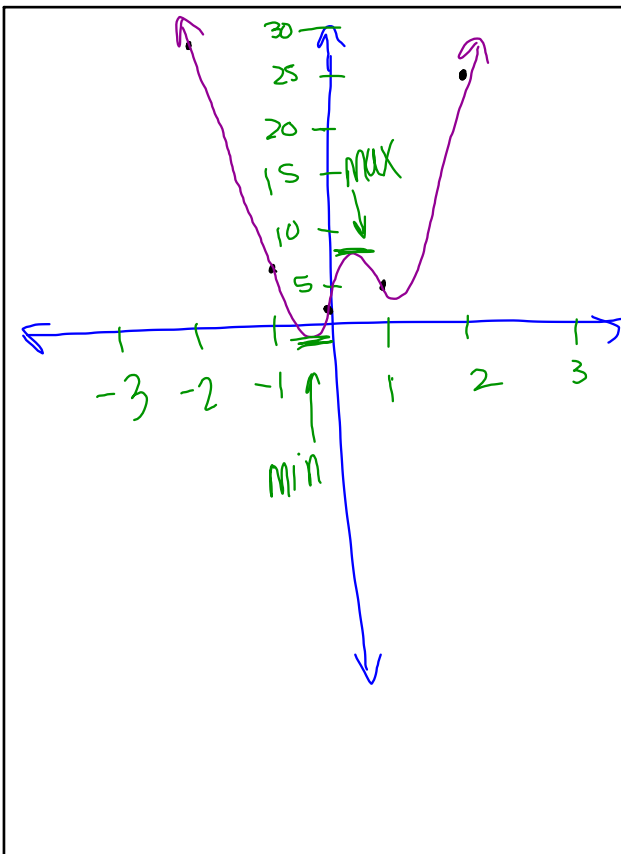
$$(-2)^4 + 2((-2)^2) - (-2) + 3$$

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X	Y
-2	29
-1	7
0	3
1	5
2	25

degree: even  $x^4$   
lead coeff: pos.  
3 turns  
both ends up

Apr 6-9:02 AM

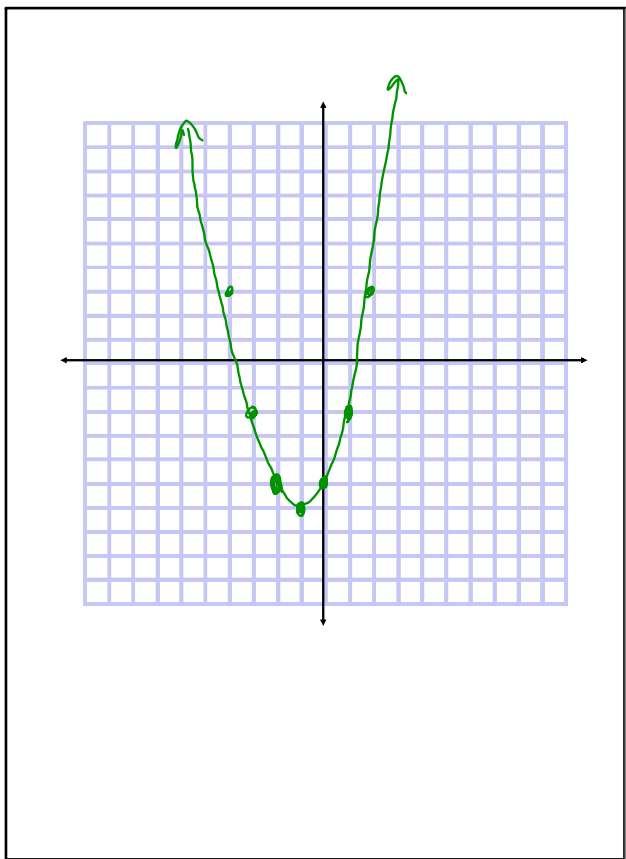


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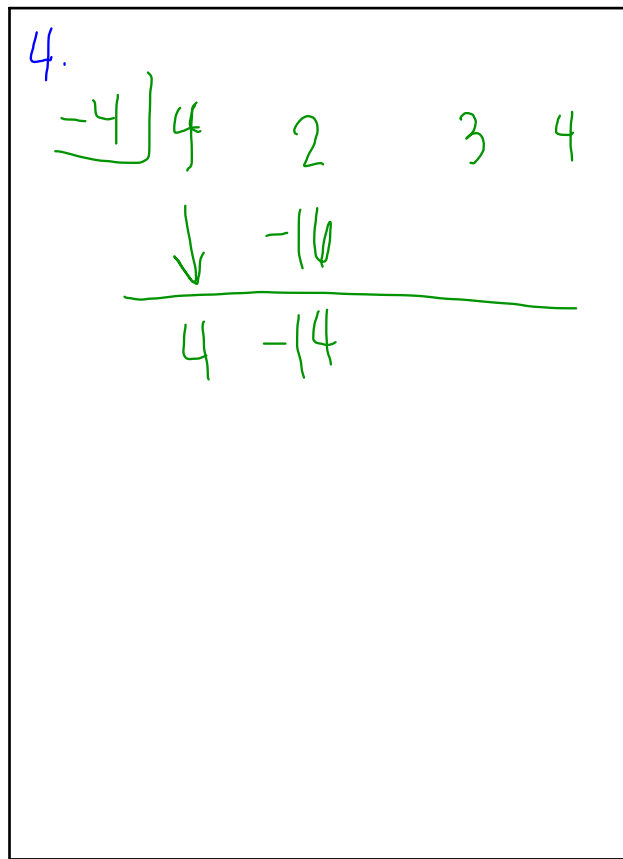
$$f(x) = x^2 + 2x - 5$$

X	Y
-2	$(-2)^2 + 2(-2) - 5$ $4 - 4 - 5$ -5
-1	$(-1)^2 + 2(-1) - 5$ $1 - 2 - 5$ -6
0	-5
1	$(1)^2 + 2(1) - 5$ $1 + 2 - 5$ -2
2	$2^2 + 2(2) - 5$ $4 + 4 - 5$ 3

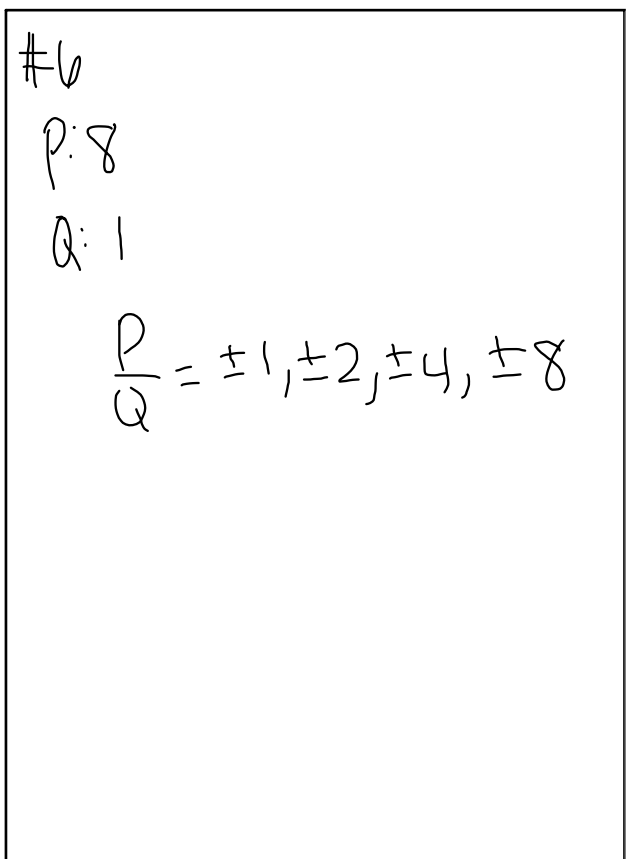
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Apr 6-9:33 AM