Odd Polynomials

Positive Leading Coefficient:

Moves from the third quadrant
to the first quadrant.
Like a line with a Positive slope

Negative Leading Coefficient:

Moves from the second quadrant
to the fourth quadrant.
Like a line with a Negative slope

Even Polynomials

Positive Leading Coefficient:

Moves from the second quadrant
to the first quadrant.
Like a parabola with a>0

Negative Leading Coefficient:

Moves from the third quadrant
to the fourth quadrant.
Like a parabola with a<0

END BEHAVIOR

EVEN Functions:

Positive Leading Coefficient:	Negative Leading Coefficient:
(↖ , ↗)	(↙ , ↘)

ODD Functions:

Positive Leading Coefficient:	Negative Leading Coefficient:
(↙ , ↗)	(↖ , ↘)

Given the equation $y = (x + 3)(x - 2)$

Give four names for -3 and 2:

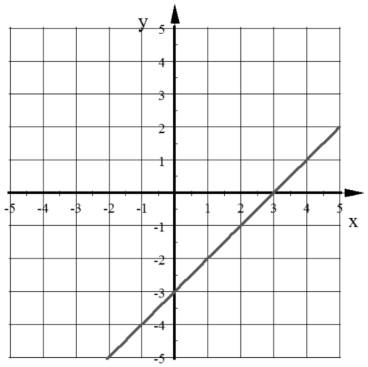
- Zeros of the function
- Solutions to the equation
- x-intercepts of the graph
- Roots of the function

What does the graph of this look like?

$y = (x - 3)^1$

A line that passes right through the x-axis at +3

+3 is called a single zero.

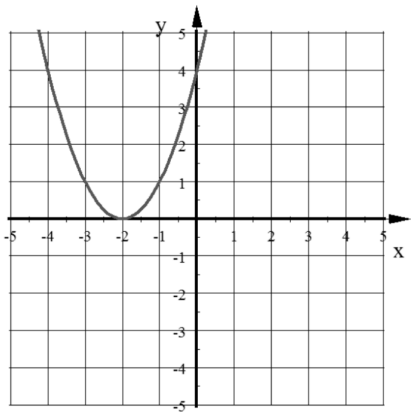


What does the graph of this look like?

$y = (x + 2)^2$

A parabola whose vertex is on the x-axis at -2

-2 is called a double zero.

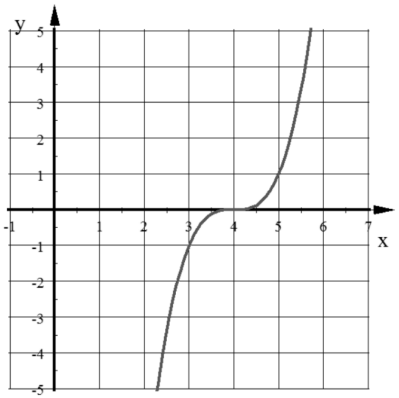


What does the graph of this look like?

$y = (x - 4)^3$

It passes through the x-axis at +4 but flattens out as it passes through.

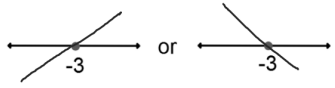
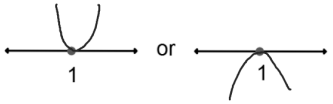
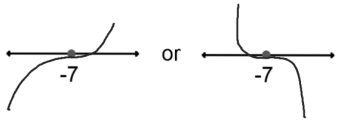
+4 is called a triple zero.



Our textbook's vocabulary

$y = (x - 3)$	+3 is a single zero	zero = 3 with a multiplicity of 1
$y = (x + 2)^2$	-2 is a double zero	zero = -2 with a multiplicity of 2
$y = (x - 4)^3$	+4 is a triple zero	zero = +4 with a multiplicity of 3

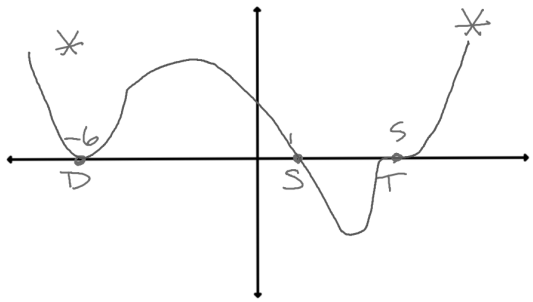
Shapes of Zeros (graphs at x-intercepts)

	Factor	Zero	Possible Shape
Single Zeros:	$(x+3)$	-3	
Double Zeros:	$(x - 1)^2$	$+1$	
Triple Zeros:	$(x + 7)^3$	-7	

Sketch a graph of this function:

$y = (x - 1)(x + 6)^2(x - 5)^3$

1. Find the Degree and LC
   Deg: EVEN LC: POS
2. Determine End Behavior (↖, ↗)
3. Find zeros and what kind
   +1: single zero -6: double zero
   +5: triple zero
4. Place dots on the x-axis for the zeros.
5. Connect Left End to Right End making sure the shape of each zero is correct.



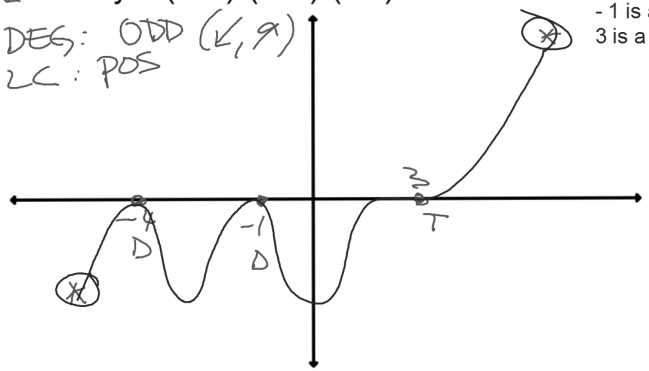
Sketch this function using the shapes of the zeros and the end-behavior

$y = (x+4)^2(x+1)^2(x-3)^3$

DEG: ODD (↙, ↗)
LC: POS

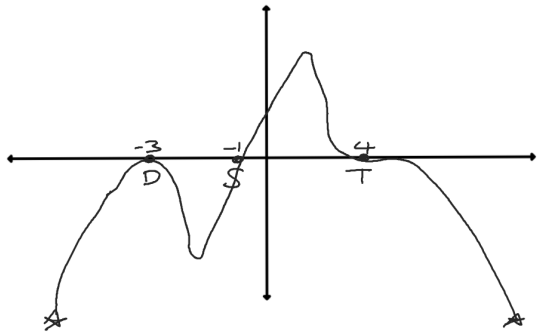
Start in Quadrant III
finish in Quadrant I

- -4 is a double zero
- -1 is a double zero
- 3 is a triple zero



Sketch this function using the shapes of the zeros and the end behavior.

$y = (4 - x)^3(x + 3)^2(x + 1)$ Even Neg (↙, ↘)

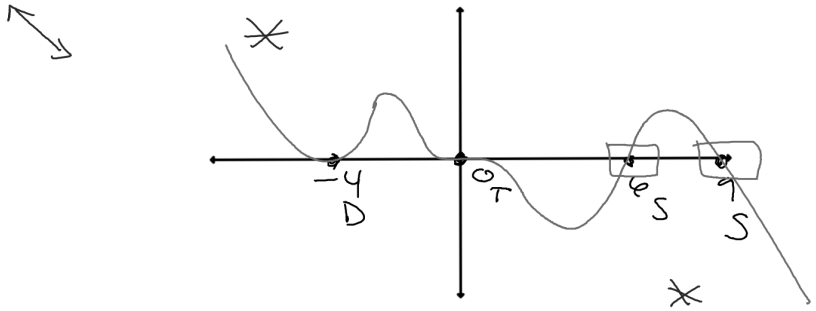


4 = T
-3 = D
-1 = S

Sketch a graph of this function:

$y = -x^{3}(x - 6)^{2}(x + 4)^{1}(x - 9)^{1}$

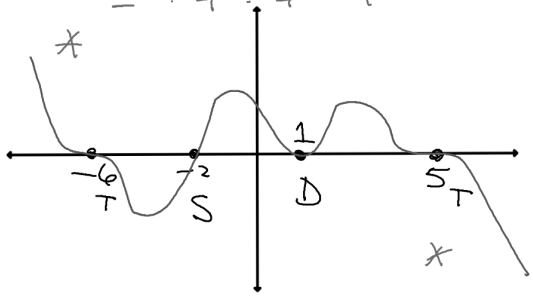
ODD
NEG



Sketch this function using the shapes of the zeros and the end behavior.

$y = (5 - x)^{3}(x + 6)^{3}(x + 2)(1 - x)^{2}$

NEG
ODD



Write a possible equation for the function shown in this graph.

$y = (x+7)^{2}(x+4)(x-2)^{3}(x-8)$