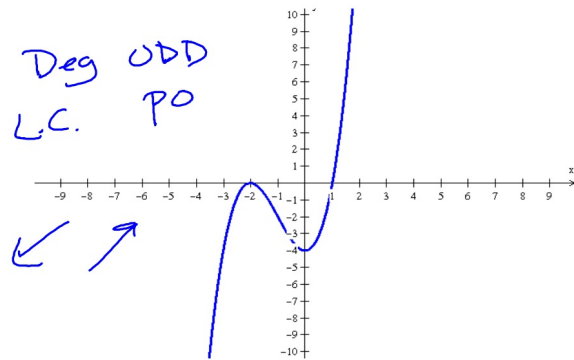


1. Graph  $y = (x-1)(x+2)^2$  in a Standard Window and sketch it below:



2. Investigate the graph around each zero

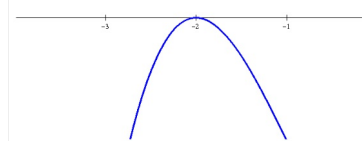
Around  $-2$ : Use the following window:  $x : [-4, 0]$  &  $y : [-2, 2]$

Sketch the graph below:

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

$-2$  is a double zero.

Double zeros look like  
Parabolas.



Describe what the graph looks like in this window.

Parabola

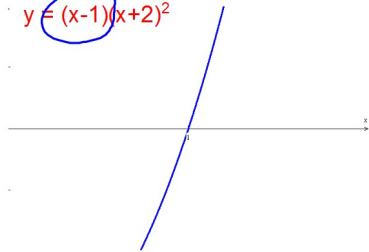
Around  $1$ : Use the following window:  $x : [0, 2]$  &  $y : [-2, 2]$

Sketch the graph below:

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

$1$  is a single zero.

Single Zeros look like  
a line passing through  
the x-axis.



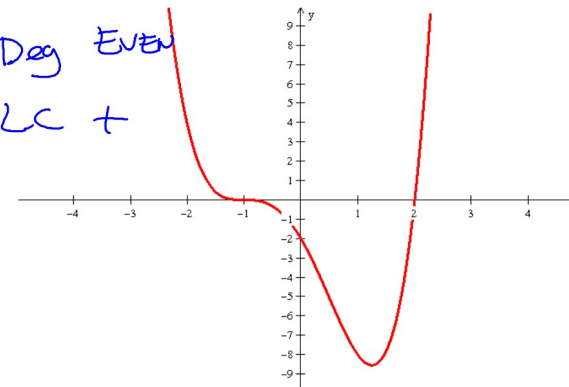
Describe what the graph looks like in this window.

line

3. Graph  $y = (x+1)^3(x-2)$  in the following window and sketch it below:

Window:  $x : [-5, 5]$  &  $y : [-10, 10]$

deg EVEN  
LC +



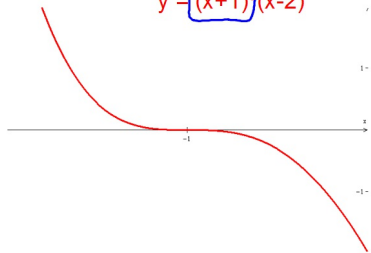
Around **-1**: Use the following window:  $x : [-2, 0]$  &  $y : [-2, 2]$

Sketch the graph below:

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

-1 is a triple zero

Triple Zeros look like:  
they pass through the  
x-axis but flatten out  
as they pass through.  
Look like a cubic function



Describe what the graph looks like in this window.

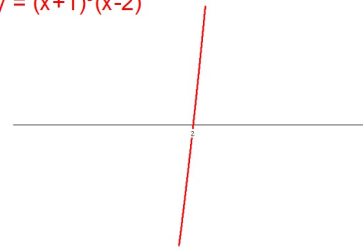
Around **2**: Use the following window:  $x : [1, 3]$  &  $y : [-2, 2]$

Sketch the graph below:

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

2 is a single zero.

Single Zeros look like  
a line passing through  
the x-axis.



Describe what the graph looks like in this window.

Shapes of Zeros

Factor

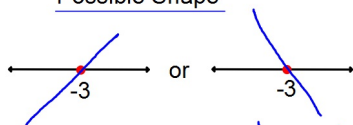
Zero

Possible Shape

Single Zeros:

$$(x+3)$$

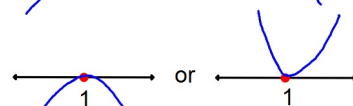
-3



Double Zeros:

$$(x-1)^2$$

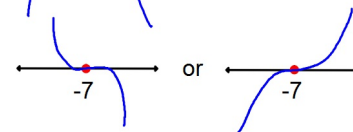
1



Triple Zeros:

$$(x+7)^3$$

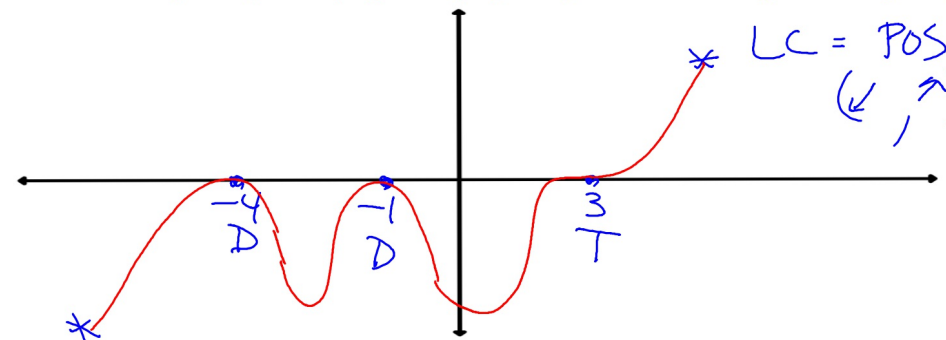
-7



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

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

$D = 7 \rightarrow \text{ODD}$   
 $LC = \text{POS}$   
( $\downarrow$ ,  $\uparrow$ )



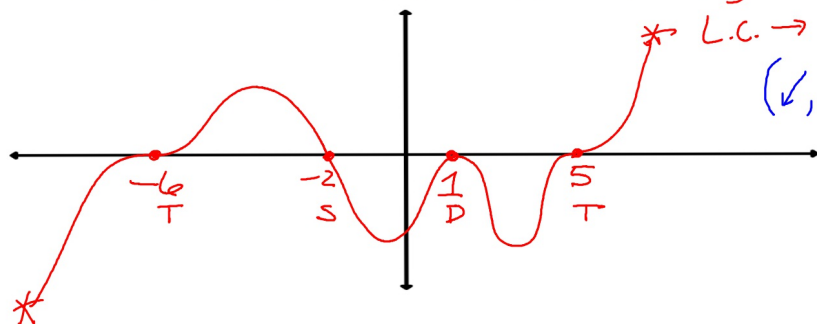
Sketch this function using the shapes of the zeros and the end behavior.

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

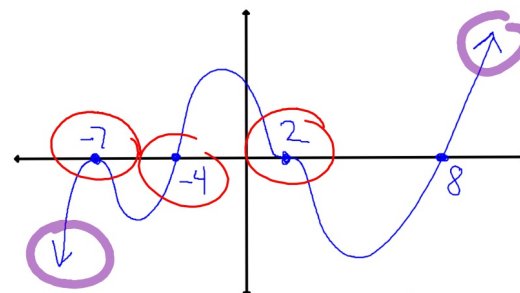
deg  $\rightarrow$  odd

L.C.  $\rightarrow$  pos

( $\downarrow$ ,  $\uparrow$ )



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



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

pos ✓  
odd ✓