

Equations and Graphs of Polynomial Functions

What is the connection between the factors of a polynomial function and the x-intercepts?

- factors are x-intercepts (once solved)
- # of factors = # zeros \*

What does a graph do when a polynomial function has a factor that occurs twice? three times?

$y = x(x+1)^2$   
 Degree 3 +ve  
 Zeros: -1, 0  
 If factor occurs 2x - (degree 2 factor) "order 2"

double root (max or min)

$y = x(x+1)^3$   
 Degree 4 +ve  
 If factor occurs 3x - degree/order 3  $\Rightarrow$  Point of Inflection (Looks "cubic" around  $x = -1$ .)

Oct 1-8:03 AM

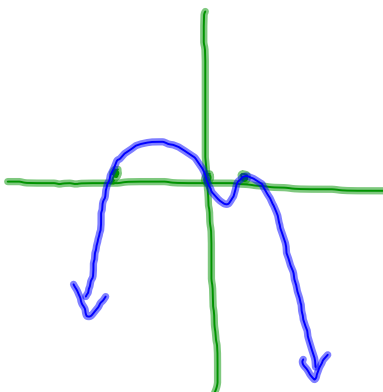
- The graph of a polynomial function can be sketched using x-intercepts, the degree of the function and the sign of the leading coefficient.
- 
- When a polynomial function is in factored form, the zeros can be determined from the factors. When a factor is repeated n times, the corresponding zero has order n.
- 
- The graph of a polynomial function changes sign only at x-intercepts that correspond to zero of odd order. At x-intercepts that correspond to zeros with even order, the graph touches but does not cross the x-axis.

Analyze the graph of  $f(x) = -x(x-1)^2(x+3)$

degree, leading coefficient, end behaviour, zeros, y-intercepts

4 -1 Q3  $\rightarrow$  Q4 0, 1, -3

$y\text{-int} = 0(0-1)^2(0+3) = 0$   
 Set x to zero



p. 39 #1-3,6,9,11  
 1.7.2-1.7.3

Oct 1-8:09 AM