

POLYNOMIALS. END BEHAVIOR AND BEHAVIOR NEAR THE ZEROS OF THE POLYNOMIAL

Previous videos: Polynomial Functions
 Polynomial Functions Part II

Example Analyze the behavior of the polynomial

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

End Behavior same as $p(x) = x^4$

when $x \rightarrow \infty, y \rightarrow \infty$

or $x \rightarrow -\infty, y \rightarrow \infty$



Near Zeros

Factors

$$\begin{matrix} p=3 & \pm 1 & \pm 3 & & p/q \\ q=1 & \pm 1 & & & \end{matrix}$$

	1	-2	-4	2	3
$x=1$		1	-1	-5	-3
	1	-1	-5	-3	0
$x=-1$		-1	2	3	
	1	-2	-3	0	
-1		-1	3		
	1	-3	0		

$$x-3=0 \Rightarrow x=3$$

Zeros mult.

1	1
-1	2
3	1

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

Near $x=1$ $f(x) = (x-1)(x+1)^2(x-3)$

Plug $x=1$ into $(x+1)^2$ and $(x-3)$ not into $(x-1)$

$$f(x) = (x-1)(1+1)^2(1-3) = -8(x-1)$$

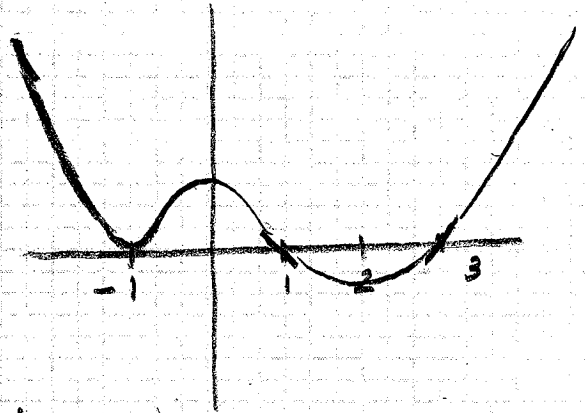
straight line with slope = -8

Near $x=-1$

plug $x=-1$ into
 $(x-1)$ and $(x-3)$
 not into $(x+1)^2$

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

$$= 8(x+1)^2 \text{ parabola } \cup$$



Near $x=3$

plug $x=3$ into $(x-1)$ and $(x+1)^2$

$$f(x) = (3-1)(3+1)^2(x-3) = 32(x-3)$$

straight line with slope = 32