Real Zeros of Polynomial Functions

If f is a polynomial function and a is a real number, the following statements are equivalent.

1. x = a is a zero of the function *f*.
2. x = a is a solution of the polynomial equation *f(x)* = 0.
3. (x - a) is a factor of the polynomial *f(x)*.
4. (a,0) is an x-intercept of the graph of *f*.

NOTE: Odd powers cross
even powers bounce/touch

Example

Sketch the function by finding the zeros, determine its end behavior, plot points and connect with a curve, state any multiplicities and relative max and mins.

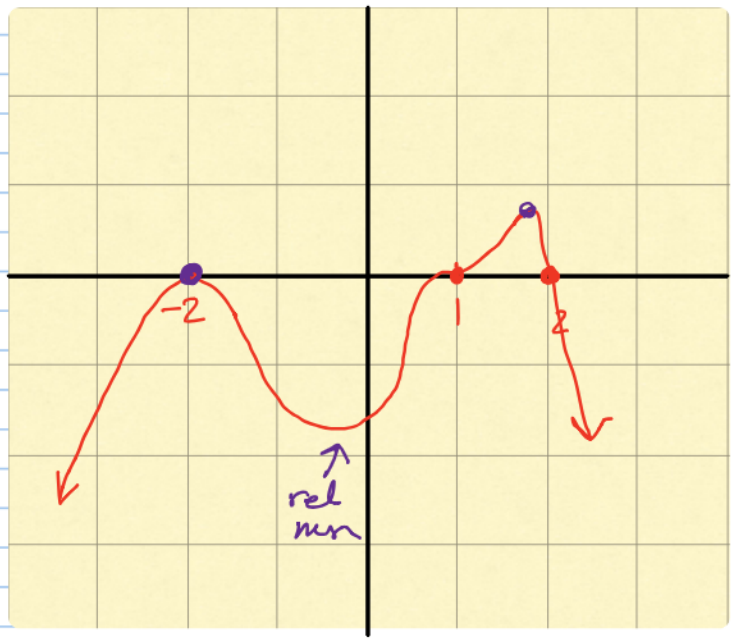
$$f(x) = -2\underbrace{(x-2)}_{x^1}\underbrace{(x-1)^3}_{x^3}\underbrace{(x+2)^2}_{x^2}$$

Degree: 6, L.C: Negative

Zeros	Multi.	Behavior on x-axis
2	single	Cross/linear
1	triple	cross/Cubic
−2	double	bounce/quad.

rel. max = 2

rel min = 1



2.2 Polynimials of higher degree

Example

Sketch the function by finding the zeros, determine its end behavior, plot points and connect with a curve, state any multiplicities and relative max and mins.

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

Degree :- 7 L.C = +

Zeros	Mult.	Behavior x-axis
0	double	Bounces
5	single	cross
-3	triple	cross
1	single	cross

rel. max : 2

rel. min : 2

Example

Sketch the function by finding the zeros, determine its end behavior, plot points and connect with a curve, state any multiplicities and relative max and mins.

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