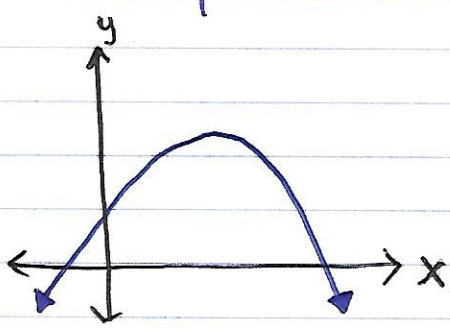


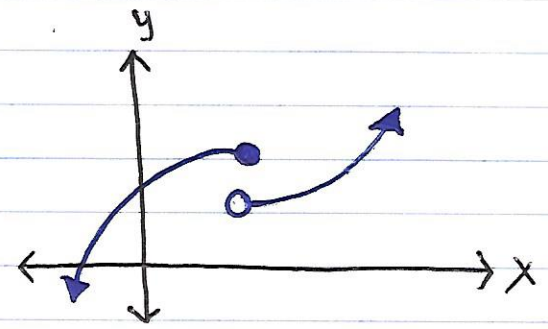
2.2 Polynomial Functions of Higher Degree 10/12-13/1

Continuous - a graph of a polynomial function that has no breaks, holes, or gaps. (graph can be drawn without lifting the pencil)

Ex ①



Continuous

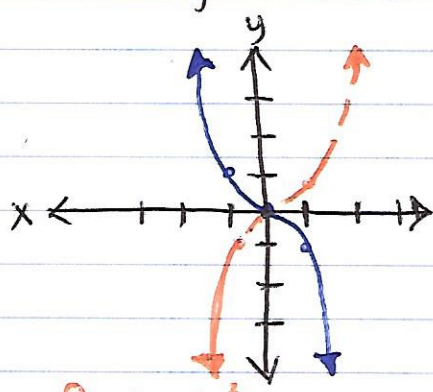


Not continuous

Power function - Polynomial functions of the form:

$$f(x) = x^n$$

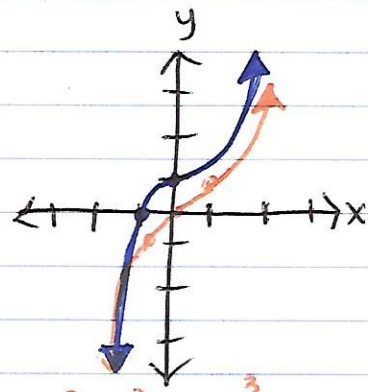
Ex. ②



$$f(x) = x^3$$

$$h(x) = -x^3$$

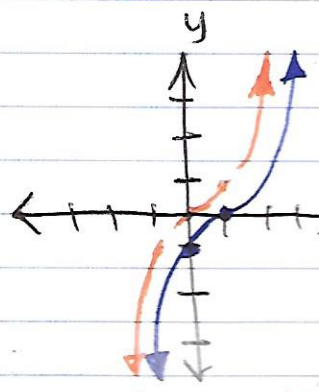
reflection across the x-axis



$$f(x) = x^3$$

$$h(x) = x^3 + 1$$

V.S 1 unit up



$$f(x) = x^3$$

$$h(x) = (x-1)^3$$

H.S 1 unit to the right

Leading Coefficient Test

- is the test which enables you to discover the behavior of the graph in terms of rising and falling.

Degree

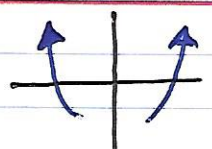
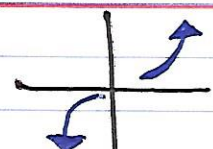
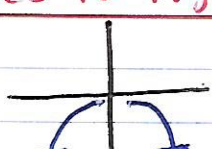

- Highest exponent in a polynomial

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

$h(x) = 4x + 3x^3 + 2$

Degree : 2

Degree : 3

Signs of Leading Coefficient \ Degree	Even $f(x) = x^2$	Odd $f(x) = x^3$
Positive (+) $f(x) = 3x^2$	 rises to left rises to right	 Falls to left Rises to right
Negative (-) $f(x) = -4x^3$	 falls to left falls to right	 Rises to left Falls to right

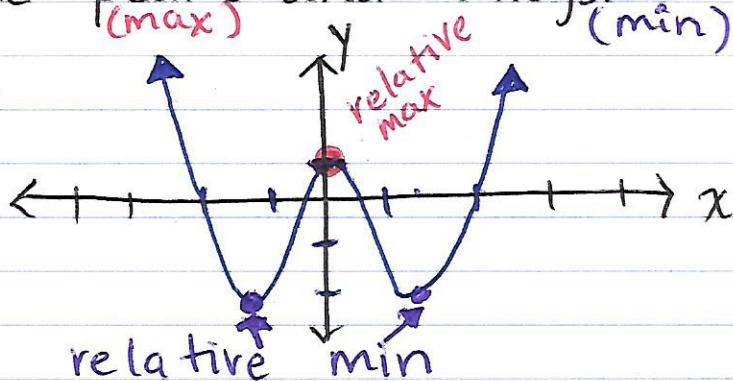
Zeros of a polynomial function

- The function f has at most n zeros
 $f(x) = ax^n + bx^{n-1} + c$

$f(x) = x^3$, has at most 3 solutions

Relative Extrema

- The graph of a function may include some peaks and valleys.



Multiplicity Ex (3)

- What is the multiplicity of $g(x) = (x-4)^3$?

Since $g(x) = (x-4)^3$, then

$$g(x) = (x-4) \cdot (x-4) \cdot (x-4)$$

$$x = 4 \quad x = 4 \quad x = 4$$

The zero 4 has multiplicity of 3.

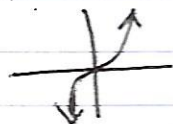
* If a zero has a multiplicity of 1, the graph crosses the x-axis

* If a zero has even multiplicity, the graph "bounces" at the x-axis

* If a zero has odd multiplicity, greater than 1, then the graph crosses the x-axis and wiggles.



even multiplicity



odd multiplicity