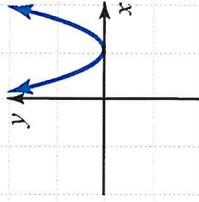
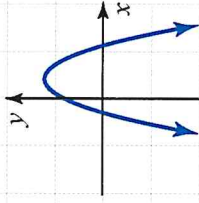
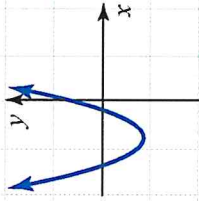


2.2 Polynomial Functions

Recall that $f(x) = ax^2 + bx + c$ is a Quadratic Function (Degree = 2)

x-intercept



turning point

End Behavior

$$y = x^2 + 4x + 2$$

$$y = -x^2 + 2x + 3$$

$$y = x^2 - 6x + 4$$

Right:

Right:

Right:

Right:

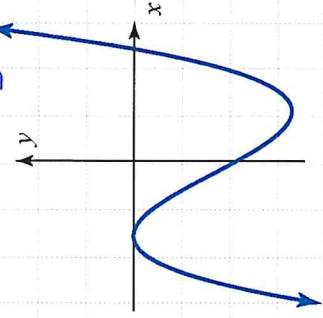
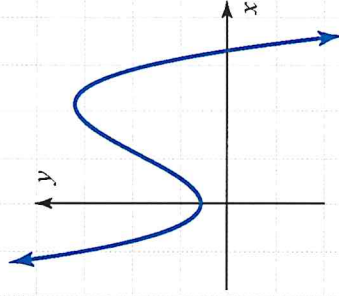
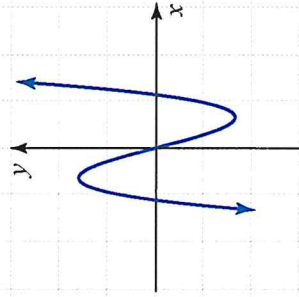
Left:

Left:

Left:

Left:

The function $g(x) = ax^3 + bx^2 + cx + d$ is a Cubic Function (Degree = 3)



$$y = 3x^3 - 12x$$

$$y = -x^3 + 7x^2 + 10$$

$$y = x^3 + x^2 - 8x - 12$$

Right:

Right:

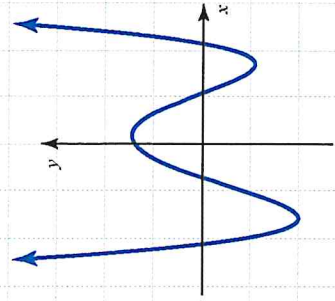
Right:

Left:

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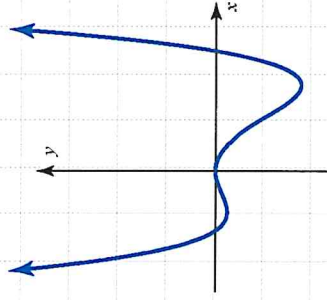
The function: $h(x) = ax^4 + bx^3 + cx^2 + dx + e$ is a Quartic Function (Degree = 4)



$$y = 3x^4 - x^3 - 14x^2 + 4x + 8$$

Right:

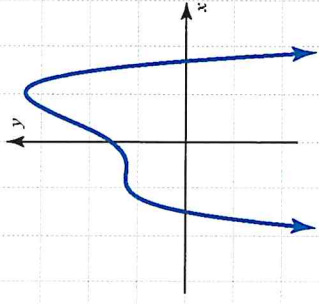
Left:



$$y = \frac{1}{2}x^4 - x^3 - 4x^2$$

Right:

Left:



$$y = -2x^4 - x^3 + 6x^2 + 7x + 10$$

Right:

Left:

Definition: A general polynomial function has the form

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \dots + a_2 x^2 + a_1 x^1 + a_0 x^0$$

where n is a positive whole number and the coefficients

$(a_n, a_{n-1}, \dots, a_1, a_0)$ are real numbers.

Ex. $M(x) = 17x^{100} - 3.14x^{50} + \frac{22}{7}x^{15} - \pi x^7 + \sqrt{10}$

Leading term:

Leading coefficient:

Constant term:

Observations from the graphs :

(1) For an n^{th} degree polynomial function there are

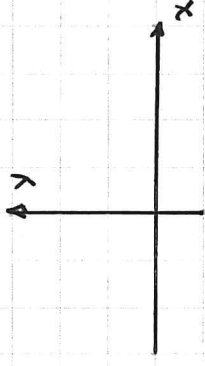
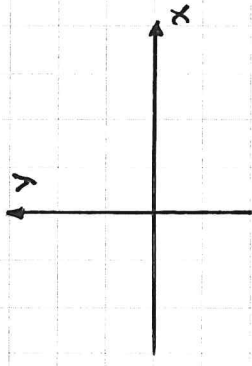
- a) a maximum of
- b) a maximum of

(2) The graph of a polynomial function is

- a) CONTINUOUS
- b) SMOOTH

(3) The End Behavior depends on

- a) the DEGREE
- b) the SIGN



Ex. ① Determine the End Behavior of the following functions

a) $f(x) = 32x^{14} + 8x^5 - 4$

b) $g(x) = -12x^7 + 5x^4$

c) $h(x) = 4x^7 - 3x^{12}$

Ex. ② Which of the following could be the graph of a polynomial function?

