

6.1 – Exploring the Graphs of Polynomial Functions

Polynomial Function (in one variable): a function that contains only the operations of multiplication and addition, with real-number coefficients, whole-number exponents, and two variables.

x – intercept: where the polynomial crosses the x – axis (possible to have many x – intercepts)

y – intercept: where the polynomial crosses the y – axis (maximum of one)

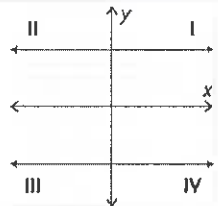
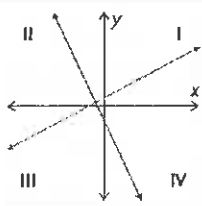
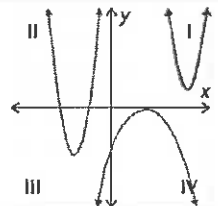
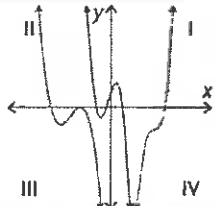
End Behaviour: the description (motion) of the graph as it proceeds from left to right.

Domain: The allowable x – values of a polynomial (almost always $x \in \mathbb{R}$)

Range: The allowable y – values of a polynomial

Degree: the highest exponent present in the polynomial

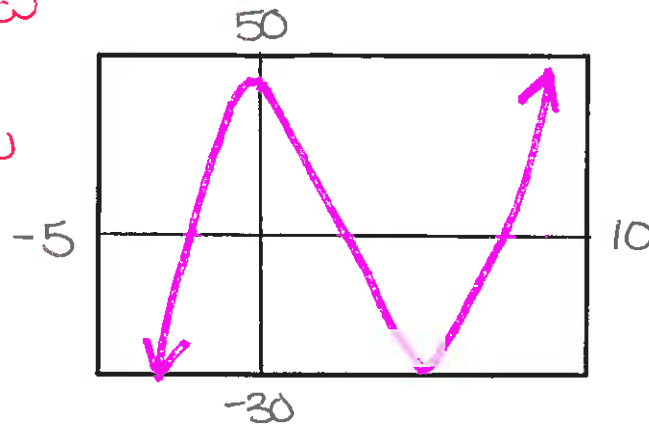
Turning Point: any point where the graph of a function changes from increasing to decreasing or decreasing to increasing.

Type of Function	Constant	Linear	Quadratic	Cubic
Degree, n	0	1	2	3
Sketch				
Number of x – intercepts	None (except when $y=0$ then every point is x -int)	1	0, 1, or 2	1, 2, or 3
Number of y – intercepts	1	1	1	1
End Behaviour	Line extends from Quadrant II to Quadrant I OR Quad III to IV	Line extends from Quad III to I ($m > 0$) OR Quad II to IV ($m < 0$)	Curve extends from II to I OR III to IV	Curve Extends from III to I OR II to IV
Domain	$x \in \mathbb{R}$	$x \in \mathbb{R}$	$x \in \mathbb{R}$	$x \in \mathbb{R}$
Range	$y = \text{constant}$	$y \in \mathbb{R}$	$y \leq \text{maximum}$ OR $y \geq \text{minimum}$	$y \in \mathbb{R}$
Number of Turning Points	0	0	1	0 or 2

Example 1: Use technology to graph the polynomial function $f(x) = x^3 - 8x^2 + x + 42$.

Determine the following characteristics for the function:

* Don't forget you must include your window when drawing a sketch of a function *



Number of x -intercepts (and their coordinates):

3 x -intercepts $(-2, 0)$, $(3, 0)$, $(7, 0)$
(find zeros on Calc Menu)

y -intercept:

$(0, 42)$ (constant term in equation or value in Calc Menu)

end behaviour:

curve goes from Quadrant III to Quad I

domain:

$$x \in \mathbb{R}$$

range:

$$y \in \mathbb{R}$$

number of turning points:

2

relative maximum/minimum points:

(maximum or minimum in Calc Menu)

Relative Max: $(0.06, 42.03)$

Relative Min: $(5.27, -28.55)$