1.1 Power Functions

A Polynomial Function is of the form

$f(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \ldots + a_2 x^2 + a_1 x + a_0$ where $a_0, a_1, \ldots, a_n$ are coefficients which are real numbers. Polynomial expression is written with powers arranged from highest to lowest degrees.

Important Definitions

- Degree of the function is n, the exponent of the greatest power of x.
- a_n, the coefficient of the greatest power of x is the leading coefficient.
- a_0 is the constant.

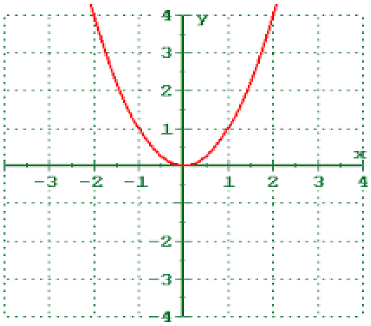
Power Function is the simplest form of polynomial function and is of the form $f(x) = a_n x^n$ where n is a whole number and a is a real number. Power functions have different names depending on the degree of the function. examples are -

$y = a$ is degree 0 and is called constant. $y = ax$ is degree 1 and is linear function.

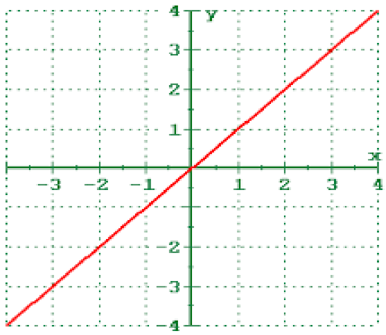
$y = ax^2$ is degree 2 and is quadratic function. $y = ax^3$ is degree 3 and is cubic function.

$y = ax^4$ is degree 4 and is Quartic function. $y = ax^5$ is degree 5 and is Quintic function.

Power Function has similar features depending on whether their degree is even or odd.



Example is an even degree power function. Such functions have line symmetry in the y-axis x=0. The line divides the graph in two parts such that each part is the reflection of the other part in the given line.



Example is an odd degree power function. Such functions have point symmetry about the origin (0, 0). Each part of the graph on one side of (0, 0) can be rotated to coincide with the part of the graph on the other side of (0, 0).

End behaviour of the graph of the function is the behaviour of the y-values as x increases ie $x \to \infty$ and as decreases ie $x \to -\infty$. The degree and leading coefficient indicates the end behaviours of the graph. An odd degree function has opposite end behaviour and an even degree function has same end behaviour.