

Answer on Question #49680 – Math – Algebra

Explain the topic “Families of functions”.
It is an algebra 2 topic

Solution

A "family" is just another word for a set.

A family of functions is a set of functions defined by the same type of formula - we can talk about the polynomial family, or 2nd degree polynomial family, or the family of sinusoidal functions and so on.

Alternatively, we can define a family by a formula that involves the argument and one or more parameters. For each specific value of the parameter(s) we'll then get one function in the family.

For example, the above three families could be defined by

$$f(x) = a_n x^n + \dots + a_1 x + a_0$$

$$f(x) = a x^2 + b x + c$$

$$f(x) = A \sin(\omega t + \varphi)$$

Functions in the same family do not always have similar shape.

For example, functions in the family

$$f(x) = 1 / (a x^2 + b x + c)$$

can have two vertical asymptotes if the denominator has two real roots, one vertical asymptote if the denominator has one real root, or a "bell shape" if the denominator does not have any real roots. Think of $1/(x^2-1)$, $1/x^2$, and $1/(x^2+1)$.