

Functions and Composite KeyPoints

Created by

Graduate Bsc (Hons) MathsSci (Open) GIMA

A function $f(x)$ consists of a rule and a domain.

Rule : is what you do to x to get the value $f(x)$

Domain : is a set of valid values for x .

e.g. $f(x) = 1/x$ for x any Real number except 0

The domain in this case cannot have 0 in it because you cannot divide by 0!

To sketching functions it is very easy if you can (and you are expected to!) remember some basic graphs:-

Quadratics : x^2

Logs : $\log(x), \ln(x)$

Trig : $\sin(x), \cos(x), \tan(x)$

If we have a function that can be made "to look like" one of the basic functions above, then to sketch it we simply move/stretch the basic function along the x, y axis's.

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Summary of the steps for a Quadratic

Given the equation in the form

$$y = a \cdot x^2 + b \cdot x + c$$

Put it in the form (by completing the square - see website section)

$$y = a \cdot (x + d)^2 + e$$

Compare to basic

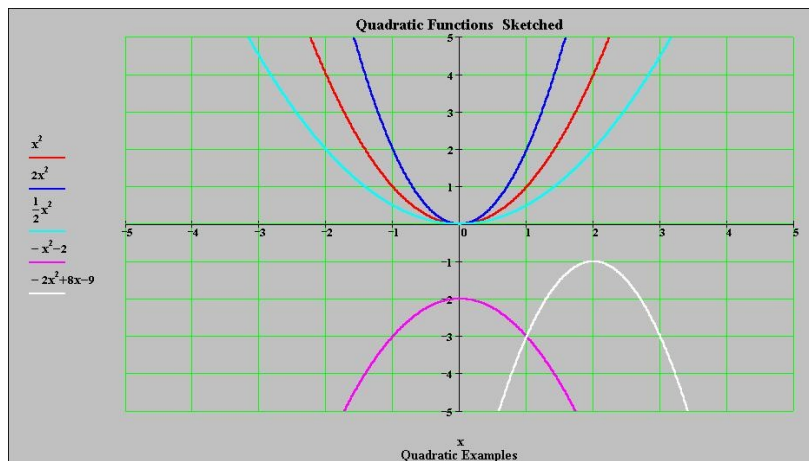
$$y = x^2$$

If $a < 1$ then basic graph is expanded, if $a > 1$ then graph is squashed, if a is negative turn basic graph upside down.

If d is negative move basic graph d places to the right, if d is positive move graph d places to the left.

If e is positive move basic graph up e places, if negative move graph e places down.

Examples



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Summary of the steps for sin and cos (also see Wave Function section)

Given the equation in the form

$$f(x) = A \sin(ax+b) + c \text{ (you may see other symbols used for } a, b, c \text{)}$$

or

$$f(x) = A \cos(ax+b) + c$$

Compare to basic

$$f(x) = \sin(x) \text{ or } f(x) = \cos(x)$$

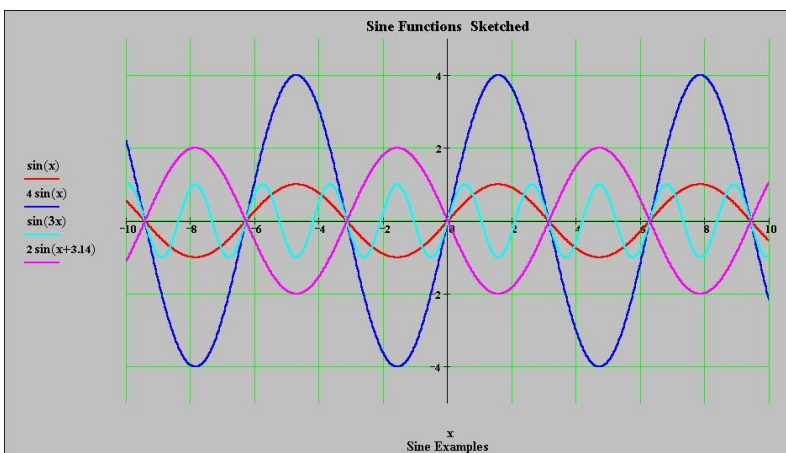
The **A** term stretches the basic sine graph in both the positive and negative y axis direction.

The **a** term tells you how many times it repeats itself between 0 and 360 degrees.

The **b** term tells you how much to shift the graph along the x-axis. (if negative shift to the right / positive shift left)

The **c** term tells you how much to shift the graph up or down the y-axis.

Examples



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Summary of steps for Logs

Given the equation in the form

$$f(x) = A \log(x+b) + c$$

Compare to basic

$$f(x) = \log(x)$$

The **A** term stretches the basic log graph in both the positive and negative y axis direction.

The **b** term tells you how much to shift the graph along the x-axis.

(if negative shift to the right / positive shift left)

The **c** term tells you how much to shift the graph along the y-axis.

(if negative shift down / positive shift up)

Examples

