

# The Classical and Nonstandard Analyses of Limits

Preston Vo

## Introduction

A **set** is a collection of elements. These elements can be anything: numbers, shapes, colors, and so on. For instance, consider the set A of the primary colors:

$$A = \{\text{red, blue, yellow}\}$$

A **function** is a mapping between the elements of two sets where each element from one set is assigned to exactly one element from the other. In the realm of single variable calculus, functions predominantly deal with sets of real numbers. For example, the function

$$f(x) = x^2$$

takes a set of inputs (x) and produces a corresponding set of their squares (f(x)) in the form of **ordered pairs**:

x	y
−3	9
−2	4
−1	1
0	0
1	1
2	4
3	9

Plotting these points on the XY coordinate plane produces the following graph: