

Calculus is about analysis of functions. This class we will look at some examples of functions.

- Specific Examples
 - Example of a function: Speed.
 - Example of a function: Prices of stock, shares, etc.
 - Volume of a gas as a function of it's temperature.
- General Properties
 - What is a function?
 - Some Qualitative properties of functions
 - slope
 - Continuous functions
 - Smooth functions

We are going to look at functions and the behavior of functions, so you can make some prediction about what they will do, and answer the following kind of questions:

- What does "speed" mean?
- How can you represent the movement of something by a graph?
- How do you interpret what the graph means, and predict what might happen?

More questions to think about:

- (1) On a car journey, what is the average speed over the whole journey?
- (2) What is the speedometer measuring?
- (3) Will the speedometer ever measure the same as the average speed of the car?

What is a function?

Basically, a function is a rule that takes one number and gives you another.

In real life, functions are usually not very easy to describe, but to make things easy, we find approximations that are easier to work with. Here are some examples of the kind of functions we will consider in this course:

- $f(x)=x^2+4$
- $f(x)=\sin(x)$
- $f(x)=e^x$

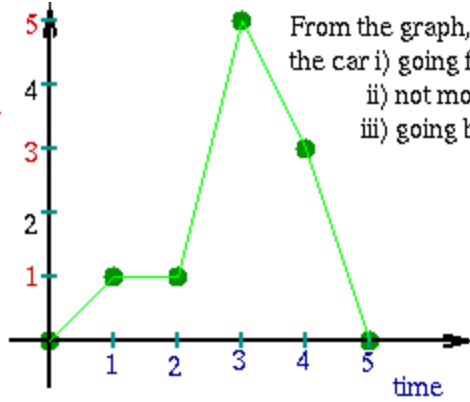
If we want to examine functions, we need to be able to compare them, look at what's going on; we need some vocabulary.

We need a more precise way of knowing about these things, how to give explicit numbers to speed, how to calculate these things for given functions, etc. This is where calculus comes in.

Example of a function
Showing motion of a car

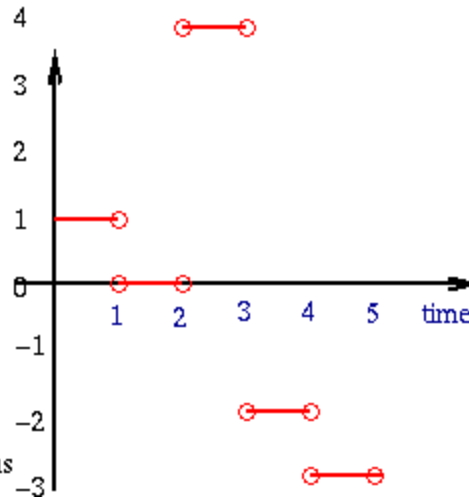
| time | distance |
|------|----------|
| 0 | 0 |
| 1 | 1 |
| 2 | 1 |
| 3 | 5 |
| 4 | 3 |
| 5 | 0 |

distance



From the graph, when is the car
i) going fastest?
ii) not moving?
iii) going backwards?

From the graph, we can get a graph of speed:



Note, in real life, the speed graph would not look like this – this graph has points where it is discontinuous