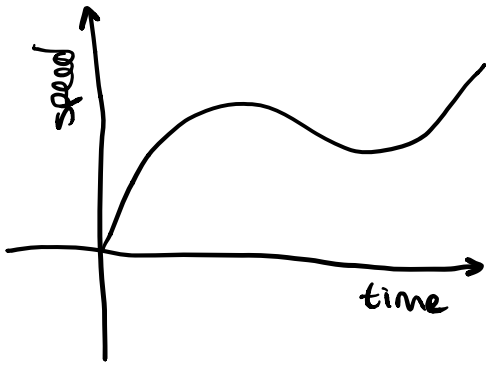
This will describe the relationship between a function and change of variables.

The Classic Example, the speed of a car.



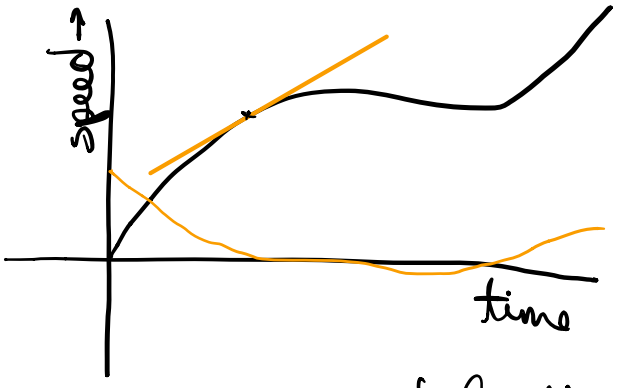
With calculus, you can determine much more than just the speed.

Acceleration – is the local gradient of a speed time graph.

The gradient at a single point is known as the local gradient.

The gradient of a speed-time can be calculated by measuring the local gradient at every point.

The points at which the acceleration function is zero (i.e crossing the horizontal axis) coincide with constant speed in the speed-time graph.



The acceleration function is the derivative of the speed function.
This is calculus and one of it's main motivations
There was a continuous function and we described every point's local gradient – to create a new function.

This gradient (and plot) process can be recursively applied arbitrarily – the number of repititions equate to the degree and the process is called a derivative.

E.g. Performing the derivative twice produces the second order derivative.

– "Jerk" is the 2nd-order deriv.

The inverse process can also be applied to determine what function would have produced the given gradient. This method is called the antiderivative (related to an integral).

- distance of a car from its starting position
  borne from the change in distance with respect to time.
  ↳ slope of the distance time graph
  ↳ rate of change