0.1 Curves and closed curves

In a space we can identify a curve between two points. If the input in the real numbers then this curve is unique.

For more general scalar fields this will not be the case. Two points in $\mathbb{R}^2$ could be joined by an infinite number of paths.

A curve can be defined as a function on the real numbers. The curve itself is totally ordered, and homogenous to the real number line.

We can write the curve therefore as:

$r : [a, b] \to C$

Where a and b are the start and end points of the curve, and C is the resulting curve.

0.1.1 Closed curves

If the start and end point of the curve are the same then the curve is closed. We can write this as:

$\oint_C f(r)ds = \int_a^b f(r(t))|r'(t)|dt$