

## 0.1 Functionals

Functionals map functions to scalars. They are the 1-forms of infinite-dimensional vector spaces.

If we have a function  $f$ , we can write functional  $J[f]$ .

### 0.1.1 More

We can define neighbourhoods around a function  $f$ . For example, taking  $y$  to be  $f$  with infinitesimal changes. to each of the values.

The difference between the functional at both points is

$$\delta J = J[y] - J[f]$$

### 0.1.2 Extrema

If

$$\delta J = J[y] - J[f]$$

is the same sign for all  $y$  around  $f$ , then  $J$  has an extremum at  $f$ .

### 0.1.3 Functional derivatives