

## Template functions

Function  $f$  in  $d(f, x)$  does not have to be defined, it can be a template function with just a name and an argument list. The argument list determines the result. For example,  $d(f(x), x)$  evaluates to itself because  $f$  depends on  $x$ . However,  $d(f(x), y)$  evaluates to zero because  $f$  does not depend on  $y$ .

Example 1.  $f(x)$  depends on  $x$ .

```
d(f(x), x)
```

```
d(f(x), x)
```

Example 2.  $f(x)$  does not depend on  $y$ .

```
d(f(x), y)
```

```
0
```

Example 3.  $f(x, y)$  depends on both  $x$  and  $y$ .

```
d(f(x, y), y)
```

```
d(f(x, y), y)
```

Example 4.  $f()$  is a wildcard that matches any symbol.

```
d(f(), t)
```

```
d(f(), t)
```

Template functions are useful for experimenting with differential forms. For example, verify the identity

$$\nabla \cdot (\nabla \times \mathbf{F}) = 0$$

```
F = (Fx(), Fy(), Fz())  
div(curl(F))
```

```
0
```