

## Exercise sheet 2

Curves and Surfaces, MTH201

1. For  $\mathbf{v} : (\alpha, \beta) \rightarrow \mathbf{R}^2$  and  $\mathbf{w} : (\alpha, \beta) \rightarrow \mathbf{R}^2$ , show that  $(\mathbf{v}(t) \cdot \mathbf{w}(t))' = \mathbf{v}'(t) \cdot \mathbf{w}(t) + \mathbf{v}(t) \cdot \mathbf{w}'(t)$ .
2. If  $\mathbf{n} : (\alpha, \beta) \rightarrow \mathbf{R}^2$  is such that  $\|\mathbf{n}(t)\|$  is constant, then prove that  $\dot{\mathbf{n}}(t)$  is either 0 or perpendicular to  $\mathbf{n}(t)$ .
3. For  $\mathbf{v} : (\alpha, \beta) \rightarrow \mathbf{R}^2$  and  $\mathbf{w} : (\alpha, \beta) \rightarrow \mathbf{R}^2$ , show that  $(\mathbf{v}(t) \cdot \mathbf{w}(t))' = \mathbf{v}'(t) \cdot \mathbf{w}(t) + \mathbf{v}(t) \cdot \mathbf{w}'(t)$  (Assume that all the functions are smooth).

To be updated...