

## Exercises

E17.c.3 [1FZ] Prerequisites: Riemann integral, [19Q]. Let  $I \subseteq \mathbb{R}$  open interval with  $0 \in I$ . Given  $f = f(x, y) : I \times [0, 1] \rightarrow \mathbb{R}$  continuous, and such that also  $\frac{\partial}{\partial x} f$  exists and is continuous, set

$$g(x) = \int_0^1 f(x, y) \, dy \quad ,$$

show that  $g$  is of class  $C^1$ , and that

$$g'(x) = \int_0^1 \frac{\partial}{\partial x} f(x, y) \, dy .$$

**Solution 1.** [1G0]