

The following problems concern the ‘Cantor function’,  $\varphi$ , as described in A-List Problem 4.

1. Show that the Cantor function is Lebesgue integrable and find  $\int_0^1 \varphi(x) dx$ .
2. Find the points,  $x$ , if any, at which the Cantor function is differentiable, and for such points, prove that  $\varphi$  is differentiable and find  $\varphi'(x)$ . Also, find the points  $y$ , if any, at which  $\varphi$  is not differentiable and prove that, for such points,  $\varphi'(y)$  does not exist.