

## Problem 4: What's Going on at 0?

---

Consider the function

$$f(x) = \begin{cases} x \ln(x), & x > 0 \\ 0, & x = 0 \\ e^x - 1, & x < 0 \end{cases}$$

1. Is  $f$  continuous at  $x = 0$ ?
2. Is  $f$  differentiable at  $x = 0$ ?

As always, show your work, fully explain and justify your answer. A solution mainly obtained by computers or calculators, or answers without proper justification will not be accepted.

---

Posting Date 10/12/2018. Submit solutions to Noah Aydin, Mathematics Department, RBH 319 (e-mail or hard-copy, but hard copy submissions must include a time stamp) by 4 pm on 10/21/18.