

Names and Student IDs: _____

Homework 11 Calculus 1

1. Let

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

Prove that

$$f^{(n)}(x) = \begin{cases} \frac{p_{n-1}(x)}{x^{2n}} e^{-\frac{1}{x}}, & x > 0 \\ 0, & x \leq 0, \end{cases}$$

where $p_{n-1}(x)$ is a polynomial with degree $n - 1$.

Prove that $f \in C^\infty(\mathbb{R})$.

2. Salas 12.9: 2, 8, 14, 15, 24, 44, 47, 49, 51.