

Practice Problem 11

Deadline: December 3, 2018

Let S be a class of functions from $[0, \infty)$ to $[0, \infty)$ that satisfies:

1. the functions $f_1(x) = e^x - 1$ and $f_2(x) = \ln(x+1)$ are in S ;
2. if $f(x)$ and $g(x)$ are in S , the functions $f(x) + g(x)$ and $f(g(x))$ are in S ;
3. if $f(x)$ and $g(x)$ are in S and $f(x) \geq g(x)$ for all $x \geq 0$, then the function $f(x) - g(x)$ is in S .

Prove that if $f(x)$ and $g(x)$ are in S , then the function $f(x)g(x)$ is also in S .