KAIST POW 2017-18

15학번 유찬진

2017년 10월 27일

Problem. Suppose f is differentiable and

$$\lim_{x \to \infty} (f(x) + f'(x)) = 2.$$

What is $\lim_{x \to \infty} f(x)$?

Solution. Since $\lim_{x \to \infty} e^x = \infty$, L'Hôpital's rule gives us

$$\lim_{x \to \infty} f(x) = \lim_{x \to \infty} \frac{e^x f(x)}{e^x} = \lim_{x \to \infty} \frac{e^x (f(x) + f'(x))}{e^x} = 2.$$

$\square$

Remark. Unlike the case of $0/0$, the numerator need not diverge to infinity to apply L'Hôpital's rule here.