Micro Teaching Session

Carlos Salinas

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Contents

1 Script

This is my script for the *Micro-teaching recitation presentation* on Monday, October 3, 2016. I have attached a sample 15-minute quiz at the end of this script.

1.1 A review of l'Hôpital's rule

Suppose we are trying to analyze the behavior of the function

$$F(x) = \frac{\ln x}{x-1}.$$

Although F is not defined when $x = 1$, we need to know how F behaves *near* 1. In particular, we would like to evaluate the limit

$$\lim_{x\to 1} \frac{\ln x}{x-1}. \tag{1}$$

In computing this limit, we cannot proceed with the typical strategy which is to compute the limit of the numerator and the limit of the denominator and take their quotients because in this case $\lim_{x\to 1} x - 1 = 0$ and the quotient $0/0$ is not defined.

In general, if we have a limit of the form

$$\lim_{x\to a} \frac{f(x)}{g(x)}$$

where both $f(x) \to 0$ and $g(x) \to 0$ as $x \to a$, the limit may or may not exist; we will call a limit of this type a *indeterminate form of type* $0/0$.

Theorem 1.1 (L'Hôpital's Rule)**.** *Suppose f and g are differentiable and $g'(x) \neq 0$ on an open interval I that contains a (except possibly at a). Suppose that*

$$\lim_{x\to a} f(x) = 0, \pm\infty \qquad \lim_{x\to a} g(x) = 0, \pm\infty.$$

Then

$$\lim_{x\to a} \frac{f(x)}{g(x)} = \lim_{x\to a} \frac{f'(x)}{g'(x)}$$

if the limit on the right side exists or is $\pm\infty$.

1.2 Homework Solutions

1.3 Sample Quiz