Assignment 2

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Problem 1(viii), ICSE 12 2019:

Using L'Hospital's Rule, evaluate:

$$\lim_{x \to 0} x \to 0 \frac{8^x - 4^x}{4x}$$

Solution:

we know that, if there is a function $f(x) = \frac{g(x)}{h(x)}$ then by L'Hospital's Rule

$$\lim x \to x_0 f(x) = \lim x \to x_0 \frac{g(x)}{h(x)} \tag{1}$$

$$= \lim x \to x_0 \frac{g'(x)}{h'(x)} \tag{2}$$

so, by equation (2),

$$\lim x \to 0 \frac{8^x - 4^x}{4x} = \lim x \to 0 \frac{\frac{d(8^x - 4^x)}{dx}}{\frac{d(4x)}{dx}}$$

$$= \lim x \to 0 \frac{8^x \log 8 - 4^x \log 4}{4}$$
(4)

Now, putting value of x=0, we get

$$= \frac{\log 8 - \log 4}{4}$$

$$= \frac{\log 2}{4}$$
(6)

$$=\frac{\log 2}{4}\tag{6}$$

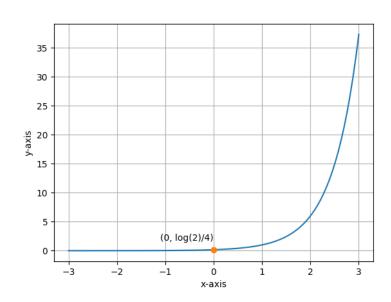


Fig. 1. graph representing the given curve and limiting point