

## CLASS DISCUSSION: 20 NOVEMBER 2017

1. Can each of the following limits be solved using L'Hôpital's rule? *Explain.*

$$(a) \lim_{x \rightarrow 1} \frac{3x^2 + 1}{2x - 3}$$

$$(b) \lim_{x \rightarrow 0} \frac{\sin x}{x^2 + 3x}$$

$$(c) \lim_{x \rightarrow 0} \frac{\cos 2x - 1}{x^3 + 5x^2}$$

$$(d) \lim_{x \rightarrow \infty} \frac{e^x}{x^{13}}$$

$$(e) \lim_{x \rightarrow 0} \frac{\sqrt{x}}{\ln x}$$

2. (MIT 18.01 final) Use l'Hôpital's rule to compute the following limits:

$$(i) \lim_{x \rightarrow 0} \frac{a^x - b^x}{x} \text{ where } 0 < a < b$$

$$(ii) \lim_{x \rightarrow 1} \frac{4x^3 - 5x + 1}{\ln x}$$

3. Using de l'Hôpital's rule, compute the following limit:

$$\lim_{x \rightarrow 0} \frac{e^{2x} - 1 - 2x - 2x^2}{x^3}$$

4. Evaluate the following limit:

$$\lim_{x \rightarrow 0} \frac{\sqrt{4+x} - 2}{x}$$

5. Evaluate the following limit

$$\lim_{x \rightarrow \infty} x^{3/x}$$

6. Evaluate the following limit

$$\lim_{x \rightarrow 0} \frac{\sqrt{1+2x} - 1 - x}{x^2}$$

7. Evaluate the following limit

$$\lim_{x \rightarrow 0} \frac{\cos(4x) - 1 + 8x^2}{x^4}$$

8. Evaluate the following limit

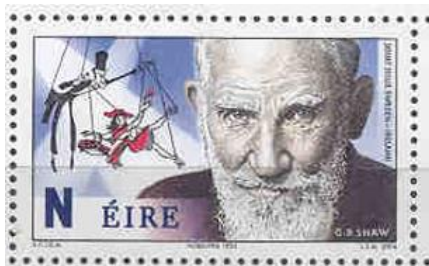
$$\lim_{x \rightarrow 1} \frac{x^{1357} - 1}{x - 1}$$

9. Can the following limit be solved using only L'Hopital's rule? *Explain.*

$$\lim_{x \rightarrow \infty} \frac{e^x}{x^{13}}$$

10. Can the following limit be solved using only L'Hopital's rule? *Explain.*

$$\lim_{x \rightarrow 0} \frac{\sqrt{x}}{\ln x}$$



*What we call education and culture is for the most part nothing but the substitution of reading for experience, of literature for life, of the obsolete fictitious for the contemporary real.*

**- George Bernard Shaw**

*A man is like a fraction whose numerator is what he is and whose denominator is what he thinks of himself. The larger the denominator, the smaller the fraction.*

*- Leo Tolstoy*

