

Mathematics for Economists I

Problems 8

L'Hospital's rule

Calculate the following limits using l'Hospital's rule. Try to calculate them using another method as well, if possible, and compare the effectiveness of both methods.

1. $\lim_{x \rightarrow +\infty} \frac{6x+9}{3x-1}$

2. $\lim_{x \rightarrow +\infty} \frac{5x^2+3x+2}{6x}$

3. $\lim_{x \rightarrow 2+} \frac{x^2-3x+1}{x-2}$

4. $\lim_{x \rightarrow 1} \frac{x^2-1}{x-1}$

5. $\lim_{x \rightarrow 1} \frac{x^{10}-1}{x-1}$

6. $\lim_{x \rightarrow 1} \frac{\ln x}{x-1}$

7. $\lim_{x \rightarrow 0} \frac{e^x-1}{x}$

8. $\lim_{x \rightarrow +\infty} \frac{e^x}{x^2+1}$

9. $\lim_{x \rightarrow +\infty} e^{-x}(x^3 + x^2 + x + 1)$

10. $\lim_{x \rightarrow 0+} (\ln x)\sqrt{x}$

11. $\lim_{x \rightarrow -\infty} e^x(x^2 + x + 3)$

12. $\lim_{x \rightarrow 4} \frac{\ln(x^2-2x-7)}{x^2-6x+8}$

13. $\lim_{x \rightarrow 3} \frac{\ln(x^2-x-5)}{x^2-7x+12}$

Solutions:

1. 2. 2. $+\infty$. 3. $-\infty$, l'Hospital's rule cannot be used. 4. 2.
5. 10. 6. 1. 7. 1. 8. $+\infty$. 9. 0. 10. 0. 11. 0. 12. 3.
13. -5 .