

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

**Řešení:**

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.