

ECON3120/4120 – Mathematics 2, spring term 08: **Problems for seminar 1, week 06**

1 Consider the function f defined by

$$f(x) = \frac{3-x}{3x-3}$$

- (a) Where is $f(x)$ defined? Compute $f(x)$ when $x = -3$, $x = -1/2$, $x = 1/4$, $x = 3/2$, $x = 3$ and $x = 9$.
- (b) Where is $f(x) \leq 0$? Where is $f(x) \leq 1$?
- (c) Draw the graph of f and see if your answers to (b) are confirmed.
- (d) Define $g(x) = \ln[f(x)]$. Where is $g(x)$ defined? Where is $g(x) > 0$?

2 Use l'Hôpital's rule (or other methods) to find:

(a) $\lim_{x \rightarrow 3} \frac{3x^2 - 27}{x - 3}$ (b) $\lim_{x \rightarrow 0} \frac{e^{-3x} - e^{-2x} + x}{x^2}$ (c) $\lim_{x \rightarrow \infty} \left(\sqrt{x^2 + \frac{1}{2}x} - x \right)$

3 The equation $e^L + KL = Ke^K$ defines L as a differentiable function of K . Find an expression for dL/dK .

4 Exam problem 9. (For a review of the definition of elasticity, see EMEA section 11.8 or MA1 section 11.11.)