# Homework III Second-Half

Due in class June 13 2017

0. Read the following sections:
Chapter 7 Derivatives in Use: Section 7.7 Why Economists Use Elasticities, 7.12 L'Hospital's Rule

1. Use L'Hospital's Rule to find:
   (a). $\lim_{x\to 0} \dfrac{e^{-3x} - e^{-2x} + x}{x^2}$
   (b). $\lim_{x\to +\infty} \dfrac{x^4 - 4x^3 + 6x^2 - 8x + 8}{x^3 - 3x^2 + 4}$
   (c). $\lim_{x\to +\infty} x^{-\frac{1}{2}} \ln x$

2. Find the elasticities of the following functions:
   (a). $f(x) = \frac{2}{x\sqrt{x}}$
   (b). $f(x) = -100x^{100}$

3. Show that $El_x(fg) = El_x f + El_x g$

4. A study of Norway's State Railway revealed that, for rides up to 60 km, the price elasticity of the volume of passenger demand was approximately $-0.4$. According to this study, what is the consequence of a 10% increase in fares?

5. The demand $D$ for apples in the US as a function of the income $r$ for the period 1927 to 1941 was estimated as $D = Ar^{1.23}$, where $A$ is constant. Find and interpret the elasticity of $D$ with respect to $r$. (This elasticity is called the income elasticity of demand, or the Engel elasticity)