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:
   \( \lim_{x \to 0} \frac{e^{-3x} - e^{-2x} + x}{x^2} \)
   \( \lim_{x \to +\infty} \frac{x^4 - 4x^3 + 6x^2 - 8x + 8}{x^3 - 3x^2 + 4} \)
   \( \lim_{x \to +\infty} x^{-\frac{1}{2}} \ln x \)

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