Worksheet 1

1. Find a second order differential equation for the function $y(x)$ for which the following functional reaches an optimal value

$$\int_{x_1}^{x_2} \frac{1 + (y')^2}{y} \, \mathrm{d}x$$

2. Find and solve the Euler-Lagrange equations for the following functional

$$\int_{x_1}^{x_2} \sqrt{x}\sqrt{1 + (y')^2} \, \mathrm{d}x$$

Homework 1 (Due January 22nd at 1:00 pm)

1. Find and solve the Euler-Lagrange equations for the following functional

$$I[y] = \int_{x_1}^{x_2} (y')^2 - y \, \mathrm{d}x$$

2. Solve the following problems from *Perfect Form* by Lemons: 2.1, 2.3 and 2.5(a).