Warm-up Problems - February 10, 2006

1. Solve the following systems of equation for x, y and λ

   (a)

   $$\begin{aligned} 16x + \lambda &= 0 \\ 28y + \lambda &= 0 \\ x + y - 60 &= \lambda \end{aligned}$$

   Hint: first solve the first two equations for λ then set these equal. Then use the last equation.

   (b)

   $$\begin{aligned} 1.6x^{-0.8}y^{0.8} + 10\lambda &= 0 \\ 6.4x^{0.2}y^{-0.2} + 50\lambda &= 0 \\ 10x + 50y - 500000 &= 0 \end{aligned}$$

   Hint: first solve the first two equations for λ then set these equal. Then use the last equation.

Lecture Problems

2. For the problem below, determine the function to maximize, the constraint and then set up the function $F(x, y, \lambda)$. If you have time, find the maximum N.

   A firm has budgeted \$50,000 per month for labor and materials. If \$$x$ thousand is spend on labor and \$$y$ thousand on materials, and if the monthy output (in units) is

   $$N(x, y) = 2xy - 4x$$

   how should the \$50,000 be allocated to labor and materials to maximize N?