Problem Set 2

1. Solve the following constrained optimization problems:

   a) $z = 2x + 3y$ subject to $2x^2 + 5y^2 = 10$.

   b) $z = (x + 2)(y + 1)$ subject to $x + y = m$

   where m is a positive constant. Verify that the local optimal solutions to (a) and (b) are also both globally optimal.

2. Solve the following maximization problem:

   $\Theta(x, y, z) = 4xyz^2$ subject to $x + y + z = 56$.

   Estimate the effect on the value of the objective function from a one-unit change in the constant of the constraint.

3. Consider the consumer problem

   $U(x,y) = (x - a)(y - b)$ subject to $px + qy = m$

   where a,b,p,q and m are positive constants and $x, y \geq 0$.

   a) Find the optimal demand functions x^*, y^* and the Lagrange Multiplier.

   b) Derive the indirect utility function $V(p,q,m)$, and show that the Lagrange Multiplier equals $\partial V / \partial m$.