

# EC314-Fall 2010 Problem Set 10

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When you write up your answers, your goal should be to (1) be correct, and (2) convince your reader that your answer is correct. Answers which do not achieve these goals will not be awarded full credit. To accomplish the second objective, it is helpful if your work is legible and if all steps are presented, possibly with a line of explanation. **Please STAPLE pages together so that we do not lose them.** (This problem set updated: 18 August 2010).

## Problems

1. Let  $F(x,y) = x^2 + y^2$  and let  $y(x)$  be defined by  $F(x,y) = 0$ . Find  $\frac{dy}{dx}$  by differentiating implicitly.
2. Let  $u(x,y) = k$ . Use the technique of implicit differentiation to derive an expression for the Marginal rate of substitution.
3. Consider a forest characterized by;

$$\begin{aligned} p &= \text{price per board foot of lumber} \\ c &= \text{cost of harvesting per board foot} \\ d &= \text{cost to replant the forest} \\ V(t) &= \text{growth equation for trees} \end{aligned}$$

- (a) Verify that the rent maximizing rotation time is increasing in  $D$ . That is, show that  $\frac{\partial T}{\partial D} \geq 0$ .
4. Suppose that there is a probability  $p$  that at the end of each cycle the owner of a tract of forest will be dispossessed of his land. Show that this will affect his behavior in the same way as an increase in  $r$ .