Problem Set #3

Economics 201B

1. Redo the analysis of second-degree price discrimination via quantity discounts using indifference curve analysis in a manner similar to the analysis in Figure 9.1 of "Lecture Notes for Economics." Assume just two types.

2. Consider a standard hidden-information agency problem in which a principal hires an agent. The agent knows his type, $\theta \in \{1, 2\}$, at the time he is hired. This is his private information. The agent's utility function is $s - \theta x^2$. The principal's utility is $x - s$. The probability that $\theta = 2$ is $\frac{1}{2}$. The agent's reservation utility is zero.

   (a) What is the full-information benchmark solution?

   (b) What is the optimal mechanism for the principal to use?

   (c) Now suppose that there is a verifiable signal, $\sigma \in \{1, 2\}$, that is correlated with the agent's type. Specifically, when x is realized, the principal and agent observe σ, which can be verified (*i.e.,* utilized in a contract). Assume the probability that $\sigma = \theta$ is $\frac{3}{4}$. In this world, what is the optimal mechanism? How does it compare with your answer to part (a)? What does this suggest?

3. Consider the same setup as question 2 (ignore the variation of part (c)). Unlike, question 2, however, assume that the type space is the *interval* $[1, 2]$ and the distribution of types over this interval is uniform (*i.e.,* $\text{Prob}\{\theta \leq t\} = t - 1$ for $t \in [1, 2]$).

   (a) What is the optimal mechanism for the principal to use?

   (b) How do $s(1)$, $s(2)$, $x(1)$, and $x(2)$ compare with those values in part (b) of question 2? Explain the differences, if any.