Dirk Bergemann
Department of Economics
Yale University

Economics 521b: Advanced Microeconomic Theory
Problem Set 1: Dominant Strategy Incentive Compatibility
1/30/13

This problem set is due 2/13/13

1. Prove the following lemma that we used in class. Lemma: Suppose f satisfies cycle monotonicity. For any $r, s, t \in T$ with $s \neq t$, we have

$$dist_{T_f}(r,t) \leq dist_{T_f}(r,s) + l(s,t). \tag{0.1}$$

2. Prove the following result that we discussed in class: Theorem: The following are equivalent for the allocation rule f: (1.) The allocation rule f is DSIC; (2.) The type graph T_f has no cycle of negative length. (3.)The allocation graph A_f has no cycle of negative length.

3. We called a generalized Groves payment rule

$$p_i(v) \triangleq h_i(v_{-i}) - \frac{1}{\lambda_i} \sum_{j \neq i} \lambda_j v_j \left(f^a(v)\right) + \kappa \left(f^a(v)\right),$$

if $\lambda_i > 0$, where $h_i : V_{-i} \to \mathbb{R}$ is an arbitrary function. Prove the sufficiency part of (Roberts 1979) theorem. Theorem: Every affine maximizer satisfying UIA can be implemented by the generalized Groves payment rule. (See (Mishra 2012), p8 for the definition of UIA).

References

Mishra, D. (2012): "Multidimensional Mechanism Design: Key Results and Research Issues," *Current Science*, 103, 1043–1051.

Roberts, K. (1979): "The Characterization of Implementable Choice Rules," in *Aggregation and Revelation of Preferences*, ed. by J. Laffont. North-Holland, New York.