

14.123 Microeconomic Theory III
Problem Set 2

The due date for this assignment is Thursday February 25 (You can return it on Tuesday March 1 without penalty.)

1. There are two urns, A and B , each consisting of 100 balls, some are black and some are red. In urn A there are 30 red balls, but the number of red balls in urn B is not known. We draw a ball from urn A with color α and a ball from urn B with color β . Consider the following acts:

$$f_{A,r} = \begin{cases} 100 & \text{if } \alpha = \text{red} \\ 0 & \text{if } \alpha = \text{black} \end{cases} \quad f_{A,b} = \begin{cases} 0 & \text{if } \alpha = \text{red} \\ 100 & \text{if } \alpha = \text{black} \end{cases}$$

$$f_{B,r} = \begin{cases} 110 & \text{if } \beta = \text{red} \\ 0 & \text{if } \beta = \text{black} \end{cases} \quad f_{B,b} = \begin{cases} 0 & \text{if } \beta = \text{red} \\ 110 & \text{if } \beta = \text{black} \end{cases}$$

Let c be the choice function induced by \succeq . Find the sets $c(\{f_{A,r}, f_{A,b}, f_{B,r}, f_{B,b}\})$ that are consistent with $110 \succ 100 \succ 0$ and Savage's postulates.

2. Exercise 6.C.19 in Mass-Colell, Whinston, and Green (Assume that the asset returns are independent.)
3. Exercise 6.D.3 in Mass-Colell, Whinston, and Green
4. Consider a monopolist who faces a stochastic demand. If he produces q units, he incurs a zero marginal cost and sells the good at price $P(\theta, q)$ where $\theta \in [\underline{\theta}, \bar{\theta}]$ is an unknown demand shock where P and C twice differentiable. Assume that the profit function is strictly concave in q for each given θ , and $P(\theta, q) + qP_q(\theta, q)$ is increasing in θ , where P_q is the derivative of P with respect to q . The monopolist is expected profit maximizer.
 - (a) Show that there exists a unique optimal production level q^* .
 - (b) Show that if the distribution of θ changes from G to F where F first-order stochastically dominates G , then the optimal production level q^* weakly increases.
 - (c) Take $P(\theta, q) = \phi(\theta) - \gamma(q)$. Suppose that there are two identical monopolists as above in two independent but identical markets. Find conditions under which the monopolists have a strict incentive to merge and share the profit from each market equally.

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