Final Exam: Microeconomics M1 TSE
April 2016

1. **True / False (no explanation is necessary)** (30 points - no penalty for wrong answers)
   (a) Suppose that lottery A is obtained from lottery B by adding nonnegative noise terms to the possible outcomes. Agents with risk aversion prefer lottery B to lottery A. (true / false)
   (b) Consider lottery A given by (4000, 1/2; 8000, 1/2) and lottery B given by (2000, 1/4; 6000, 1/2; 10000, 1/4). Any risk-averse agent prefers lottery A to lottery B. (true / false)
   (c) In common-value auction environments, in general the revenue equivalence between first and second price auction fails. (true / false)
   (d) In a second-price auction with a private-value auction environment and risk-neutral bidders (agents), it is optimal for each bidder to bid precisely the value of the good for this bidder, regardless of the other bidders' behavior. (true / false)
   (e) In a common-value auction environment with risk-neutral bidders (agents), it is an equilibrium for each bidder to bid the expected value of the good given his signal. (true / false)
   (f) In a moral hazard problem, the principal cannot anticipate the action the agent will choose at equilibrium. (True/False)
   (g) With a risk averse agent the principal cannot obtain the first best allocation in the adverse selection model. (True/False)
   (h) Limited liability constraints are less likely binding in equilibrium than participation constraints (True/False)
   (i) Second best contracts in the moral hazard model are such that the agent's optimal effort is higher than with first best contrats. (True/False).
   (j) The Revelation Principle applies only in the adverse selection model. (True/False)
2. **Risk** [35 points in total]
   (a) Consider two lotteries $\tilde{x}$ and $\tilde{y}$, where $\tilde{x} \sim U(-4, 4)$, and $\tilde{y} \sim U(-2, 3)$ ($U(a, b)$ means a uniform distribution between a and b).
      i. Is $\tilde{y}$ preferred to $\tilde{x}$ by any individual with an increasing utility function? Explain your answer.
      ii. Is $\tilde{y}$ riskier than $\tilde{x}$? Explain your answer.
      iii. Is $\tilde{y}$ preferred to $\tilde{x}$ by any risk-averse individual? Explain your answer.
   (b) A friend of yours changed his job. In the previous job, his future wealth was represented by a lottery $\tilde{x} = (-3, \frac{2}{5}; 1, \frac{3}{10}; 3, \frac{3}{10})$, while in the new job, it is represented by another lottery $\tilde{y} = (-2, \frac{1}{2}; 2, \frac{1}{2})$.
      i. Show that $E(\tilde{x}) = E(\tilde{y})$ and the new job has a lower variance.
      ii. Is he risk-averse? Explain your answer.

3. **Incentives** [35 points in total]

1. A monopolist (The principal) can produce a high quality good and/or a low quality good. The marginal cost of production is zero for both qualities. The utility of a type θ consumer (the agent) is given by

$$\theta q - p,$$

where q is the quality of the good that he consumes and t is the price that he pays to the monopolist. There is a mass one of consumers: 3/4 of them have $\theta = \underline{\theta} = 1$ and 1/4 of them have $\theta = \overline{\theta} = 3$. The monopolist knows the distribution of consumer types. The quality is such that for high quality, $q = \overline{q} = 4$ and for low quality, $q = \underline{q} = 1$. Assume that the reservation utility is zero for both types of consumers.

1.1. Suppose that the monopolist (i.e. the principal) sells only the high quality good. What is the profit-maximizing price? What is the profit?

1.2. Suppose that the monopolist sells both the high quality good and the low quality good through a menu $\left\{(\overline{q}, \overline{p}), (\underline{q}, \underline{p})\right\}$. Write the participation and incentive compatibility constraints as well as the firm's objective function. Compute the optimal menu of contracts and the profit.

1.3. From 1.1 and 1.2, obtain an answer to the question of whether the monopolist will sell only the high quality good or both the high quality and the low quality goods.