This test has a total of 100 points. Please submit your answers to the questions in the same order as they appear in the exam. Indicate clearly which question is being worked upon, and please highlight your answers with boxes. Good luck!

Total allowed time: 2 hours. Closed book, closed notes.

1. **[20 points]**

   The *Rocky Road*, a new amusement park on Mars, is trying to set its admissions prices. There are two species of Martians, the *Forbs* and the *Gorbs*. The demand for admission among gorbs is given by the demand curve $p_g = 100 - 2q_g$, and the demand for admission among forbs is given by the demand curve $p_f = 50 - 2q_f$. The marginal cost of serving each patron is zero.

   (a) What is the profit-maximizing pricing policy for Rocky Road? How many forbs and gorbs would enter the park? (5 pts)

   (b) If price discrimination were illegal, and the Rocky Road had to set a uniform price for both forbs and gorbs, what would be the price of admission? How many forbs and gorbs would enter the park? (5 pts)

   Now assume that the demand curve for gorbs changes to $p_g = 100 + q_f - 2q_g$, reflecting that gorbs are willing to pay more if there were more forbs in the park.

   (c) What are the optimal discriminatory prices in this case? (5 pts)

   (d) What is the optimal uniform price? (5 pts)

2. [**30 points**]

The Caltech campus store (CCS) is trying to hire workers. There are two types of workers: *hi-ability* and *lo-ability*, and they occur in the population in a 50-50 ratio. Assume that a worker works 40 hours a week.

Assume that, by law, the lowest wage which can be charged by CCS is the minimum wage, of $8 per hour. Assume that revenue generated for CCS by a hi-ability worker is $17 per hour, but by a lo-ability worker is only $11 per hour. Also, assume that hi-ability workers will not work unless they are offered a wage exceeding $12 per hour; lo-ability workers, on the other hand, work for any wage.

Throughout, we assume that CCS cannot determine whether or not an employee is hi- or lo-ability.

(a) Describe the long-run competitive (free-entry) equilibrium in the market assuming that BN can only offer the same wage to any worker (i.e., cannot discriminate among workers). What is the equilibrium wage?

Now assume that CCS can discriminate based on the ability of workers to speak Arabic. Assume that initially, none of the workers know how to speak Arabic, but have the opportunity to take weekly Arabic lessons. Arabic lessons cost $100 per hour. Hi-ability people only need 2 hours of lessons a week, but lo-ability people require 5 hours of lessons a week.

(b) Assuming that CCS pays the minimum wage to workers who do not know Arabic, what wage would be paid to Arabic-speaking workers to ensure that only hi-ability workers take Arabic lessons? Show all your derivations.

(c) Now assume that there is competition among Arabic teachers, and the wage for a Arabic teacher falls to $20 an hour. Derive a pair of prices for Arabic-speaking and non-Arabic-speaker workers such that only hi-ability workers take Arabic lessons?

3. Short answers [**10 points each**]

   (a) What is the "Monopoly Umbrella"?

   (b) What is the "Diamond Paradox"?

   (c) True or False: the "Winner's Curse" is an example of a moral hazard problem. Explain completely.

4. [**20 points**]

   These are the prices charged by the Red Door Cafe for drip coffee.

   | Small (12oz.)   | $1.75 |
   |-----------------|-------|
   | Regular (16oz.) | $1.95 |
   | Large (20oz.)   | $2.15 |

   (a) (10 pts) According to the theory of nonlinear pricing, in what way is the Large size "optimal"? In what ways are the smaller sizes (Small and Regular) "suboptimal"? Be specific.

   (b) (5 pts) According to this theory, why does Red Door offer "quantity discounts" (ie. the price per ounce of coffee is decreasing in the total quantity bought)? Be specific.

   (c) (5 pts) Apparently, Red Door is considering introducing an "X-Large" size (24oz.). Again using the theory of nonlinear pricing, how would you expect the new product to be priced, and how would the prices for the other products change?