Economics 103

P R A C T I C E E X A M f o r t h e S E C O N D M I D T E R M

1. Paul owns a firm. His von Neumann-Morgenstern utility-of-money function is given by

\[ U(y) = y \]

Paul wants to hire Meg to run the firm for him. Meg's von Neumann-Morgenstern utility-of-money function is given by

\[ V(w) = \sqrt{w} \]

Let \( x \) denote the firm's profits and assume that \( x \) can only take one of the following values: 1, 2, 3, or 4. The probability distribution of \( x \) is given by:

<table>
<thead>
<tr>
<th>profits</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>probability</td>
<td>( \frac{1}{4} )</td>
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Suppose that Meg's reservation utility (the utility she gets if she works for somebody else) is 1. Paul's utility if he runs the firm himself is 1. Describe a contract that is Pareto efficient and acceptable to both parties.

2. There are two types of potential workers: those (Group I) with marginal productivity \( \left( 6 + \frac{2}{3}y \right) \) and those (Group II) with marginal productivity \( \left( 10 + \frac{1}{2}y \right) \), where \( y \) denotes the amount of education. Each worker knows whether she belongs to Group I or Group II, while the potential employer does not. The cost of acquiring \( y \) units of education is \( 4y \) for Group I and \( 2y \) for Group II. The potential employer believes that those applicants with education below \( a \) belong to Group I and those with education of at least \( a \) belong to Group II and offers each applicant a wage equal to the applicant's estimated productivity. Find all the values of \( a \) that give rise to a signaling equilibrium.

3. Alice has just graduated from UCD and has been offered a job that pays $50,000 a year for the first three years and then $60,000 a year starting from the fourth year. Her other option now is to go to Law School, which will take 3 years. Tuition, fees, books and other expenses during those three years amount to $42,000 per year. She can get an interest-free loan from her parents for this, with the agreement that she will pay back $18,000 each year for 7 years after she starts working. After she graduates from Law School she is guaranteed a job at a salary of $120,000 per year. Alice has decided that exactly ten years from now she will leave the work force to start a family. If all she cares about is her net income during the next 10 years and her discount rate is 8%, should she accept the job offer or enroll in Law School?