Microeconomics 2 - Final Examination
Total Score: 50

1. Consider the signaling game in Figure 1. There are three types of Sender: $\{t_1, t_2, t_3\}$. The probability that a Sender is of either of the three types is $\frac{1}{3}$. The Sender has two strategies L and R and the Receiver has two strategies u and d. The relevant payoffs for every strategy profile is shown in Figure 1 (first number indicates the payoff of the Sender and the second number indicates the payoff of the Receiver).

   - Pooling on L: Specify all pure strategy pooling perfect Bayesian equilibria in which all Sender types play L. **7 marks**
   - Identify the set of all pue strategy pooling on L perfect Bayesian equilibria which satisfy the dominance criterion (i.e., beliefs on messages dominated for a type must be zero). **4 marks**
   - Identify the set of all pure strategy pooling on L perfect Bayesian equilibria which satisfy the Intuitive criterion. **4 marks**

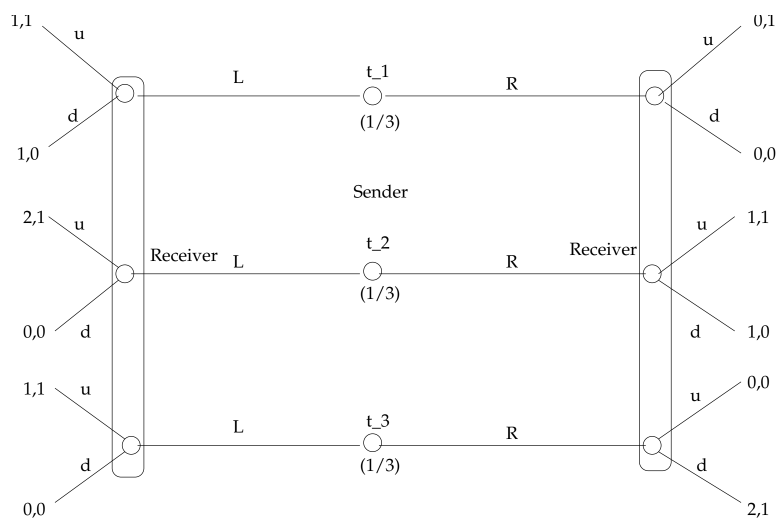

Figure 1: A Signaling Game

2. Find all (both pure and mixed) weak perfect Bayesian Nash equilibria of the game in Figure 2. **10 marks**

3. Consider a model of adverse selection where the type of each worker is drawn uniformly from $[1, 2]$. The type of the worker is unobservable to firms (firms are risk-neutral, price-taking, and use identical constant returns to scale technology). Each worker's home production function is $r(\theta) = \frac{\theta^2 - 1}{2}$.

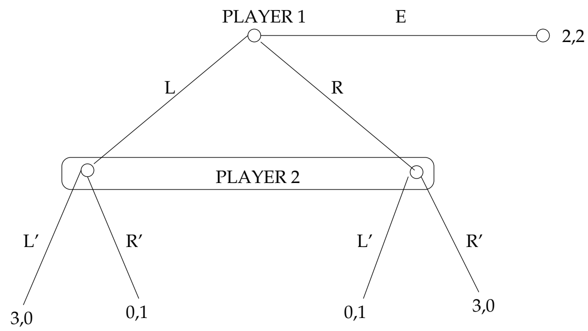

Figure 2: An Extensive Form Game

- If workers' types were perfectly observable, then what is the Pareto optimal allocation? **2 marks**
- Suppose workers' types are not observable.
  - What is the competitive equilibrium wage and which workers are hired by firms? **4 marks**
  - Describe adverse selection in this model. **2 marks**
  - Is this competitive equilibrium constrained Pareto optimum? **2 marks**

4. Consider the following hidden action principal agent model (moral hazard) with three possible actions $E = \{e_1, e_2, e_3\}$. There are two possible profit levels $\pi_H = 10$ and $\pi_L = 0$. The probabilities of π_H conditional on the effort levels are

$$f(\pi_H|e_1) = \frac{2}{3}, f(\pi_H|e_2) = \frac{1}{2}, f(\pi_H|e_3) = \frac{1}{3}.$$

The agent's effort cost function $g(\cdot)$ is given by

$$g(e_1) = \frac{5}{3}, g(e_2) = \frac{8}{5}, g(e_3) = \frac{4}{3}.$$

Finally, let the value of wage to the agent is given by $v(w) = \sqrt{w}$, and the reservation utility of the agent is $\bar{u} = 0$.

- What is the optimal contract when effort is observable? **3 marks**
- Show that if effort is not observable then e_2 is not implementable. **3 marks**
- What is the minimum expected wage for implementing e_1 and e_3 when effort is not observable? **6 marks**
- Determine the optimal contract when effort is not observable. **3 marks**