

1. Construct a three-player extensive form game where there are multiple subgame perfect equilibria, and at least one Nash-equilibrium that is not subgame perfect. Specify the requested equilibria.

2. There is a risk neutral principal and an agent whose utility is given by $u(w, e) = \sqrt{w} - e^2$ where w is wage and $e \in \{e_L, e_H\}$ is the effort level. The agent's outside option is worth $\underline{u} = 2$. There are two outcomes x_1 and x_2 where the latter one is better. The probability that x_2 is realised is given by $p_L = \frac{1}{4}$ if the agent chooses $e_L = 1$, and by $p_H = \frac{1}{2}$ if the agent chooses $e_H = 2$. Assuming that the principal wants the agent to choose high effort determine the optimal contract that the principal offers the agent.

3. Two players play an infinitely repeated version of prisoners dilemma

	c	d
c	6, 5	0, 11
d	9, 2	4, 4

Each player discounts future with factor $0 < \delta < 1$. Determine equilibrium strategies such that the players play (c, c) in each period. What is required of the discount factor?

4. Assume that two thirds of the population are low-productivity workers with productivity θ_l and one third high-productivity workers with productivity $\theta_h > \theta_l$. Workers can obtain a level of education $e \in [0, \infty)$. The cost is $c_l(e) = 2e$ for low-productivity workers and $c_h(e) = e$ for high-productivity workers. Workers are paid their expected productivity. If a worker of type $i \in \{l, h\}$ is paid w and obtains education e his/her utility is given by $w - c_i(e)$.

i) Determine the least efficient separating equilibrium. What kind of out-of-equilibrium expectations are needed to support it?

ii) Determine the most efficient pooling equilibrium. What kind of out-of-equilibrium expectations are needed to support it? Argue that this equilibrium is not reasonable.