

2.4. Two partners would like to complete a project. Each partner receives the payoff V when the project is completed but neither receives any payoff before completion. The cost remaining before the project can be completed is R . Neither partner can commit to making a future contribution towards completing the project, so they decide to play the following two-period game: In period one partner 1 chooses to contribute c_1 towards completion. If this contribution is sufficient to complete the project then the game ends and each partner receives V . If this contribution is not sufficient to complete the project (i.e., $c_1 < R$) then in period two partner 2 chooses to contribute c_2 towards completion. If the (undiscounted) sum of the two contributions is sufficient to complete the project then the game ends and each partner receives V . If this sum is not sufficient to complete the project then the game ends and both partners receive zero.

- Depict this strategic situation as an extensive form game by using a game tree.
- What is the subgame perfect equilibrium?

2.6. Three oligopolists operate in a market with inverse demand given by $P(Q) = a - Q$, where $Q = q_1 + q_2 + q_3$ and q_i is the quantity produced by firm i . Each firm has a constant marginal cost of production, c , and no fixed cost. The firms choose their quantities as follows: (1) firm 1 chooses $q_1 \geq 0$; (2) firms 2 and 3 observe q_1 and then simultaneously choose q_2 and q_3 , respectively. What is the subgame-perfect outcome?

2.11. The simultaneous-move game (below) is played twice, with the outcome of the first stage observed before the second stage begins. There is no discounting. Can the payoff $(4, 4)$ be achieved in the first stage in a pure-strategy subgame-perfect Nash equilibrium? If so, give strategies that do so. If not, prove why not.

	L	C	R
T	3, 1	0, 0	5, 0
M	2, 1	1, 2	3, 1
B	1, 2	0, 1	4, 4

2.12. What is a strategy in a repeated game? What is a subgame in a repeated game? What is a subgame-perfect Nash equilibrium?

2.13. The U.S. government had a major problem trying to motivate several million teenagers to register for the military draft. Large-scale civil disobedience would make it impossible to punish everyone who violated the law. Still, the government had a big advantage: it set the rules.

To see the advantage of moving first, imagine that the government is only allowed to punish *one* person who fails to register. How can they use this single threat to induce everyone to register?