

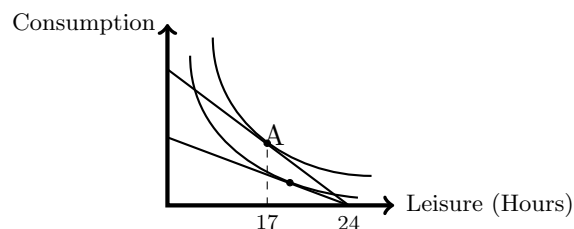
Microeconomics, Review Notes

November 19, 2025

Keywords: (Final exam from 2 to 3, as scheduled), Marginal revenue product of labor, Labor demand, Consumption–Leisure choice, Labor supply, Rule of 72, Present discounted value, Expected utility, Certainty equivalent, Risk premium, Risk aversion, Social welfare functions, Pareto efficiency

1. A firm's marginal product of labor is given as $L^{0.5}$, and the marginal revenue is 10. What's the firm's marginal revenue product of labor? If the labor market is perfectly competitive, how many units of labor would this firm demand when $w = 20$?

2. A worker's consumption–leisure choice is determined at point A. What's the labor supply level of the worker? What would happen when the wage halved?



3. If you invest \$5,000 at an annual interest rate of 9%, about how many years will it take for you to get \$20,000 according to the Rule of 72?

4. A farmer can plant a new crop that yields \$90,000 with probability 0.3 and \$10,000 with probability 0.7. Alternatively, she can continue with her usual crop that gives a guaranteed \$32,400. Her utility function is $U(W) = \sqrt{W}$. Compute the expected utility and the certainty equivalent of the new crop. Would she plant a new crop?

5. A narrow bridge connects points A and B, and it takes 10 minutes to cross. When a car is on the bridge, cars traveling in the same direction can enter, while those heading in the opposite direction must wait at the entrance. Consider five self-driving cars: Car1, Car2, Car3, and Car4 arrive at point A at 8:00, 8:09, 8:10, and 8:11, resp., while Car5 arrives at point B at 8:01. Each passenger's utility function is $u(w) = -w$, where w is a waiting time. The social planner considers in what order the cars should cross the bridge.

- (a) How would the utilitarian social planner let the cars move?
- (b) How would the Rawlsian social planner let the cars move?
- (c) Now suppose that their utility function is $u(w) = -w^2$. How would the utilitarian social planner let the cars move?

6. Two survivors, A and B, from a shipwreck arrived at a desert island. They have 10 bananas in total. A and B's utilities are $U_A(a) = \sqrt{a}$ and $U_B(b) = 2\sqrt{a}$, where a and b are bananas assigned to A and B, respectively.

- (a) Describe the utility possibility frontier.
- (b) The social welfare is given as $SW(U_A, U_B) = \min\{2U_A, U_B\}$. Draw social indifference curves.
- (c) Find the socially optimal allocation. Is the socially optimal allocation Pareto efficient?