

# Microeconomics, Review Notes

## November 26, 2025

**Keywords:** (Q4: Ch. 12–15// Final: Ch. 10–17), Edgeworth box, Exchange efficiency, Contract curve, Competitive equilibrium (in the exchange economy), First/Second Fundamental Theorem of Welfare Economics, Adverse selection, Moral hazard, Principal-Agent model, Signaling

1. George and Harriet are two agents in an exchange economy. George is endowed with 7 units of ale and 2 units of bread, and Harriet is endowed with 3 units of ale and 3 units of bread.
  - (a) Draw the Edgeworth box relevant to this situation.
  - (b) Suppose George's  $MRS_{AB} = 2$  and Harriet's  $MRS_{AB} = 5$  at the current allocation. Is the allocation Pareto efficient? If not, propose a mutually beneficial direction of trade.
2. Consider a two-person two-good exchange economy. Person A's utility is given by  $x_A + y_A$ . Person B's utility is given by  $\min\{x_B, y_B\}$ . Total endowment is (10, 10). Derive the contract curve.
3. Consider a two-person two-good exchange economy. Person A's utility is given as  $x_A y_A$ , and Person B's utility is given as  $x_B + y_B$ . A is endowed with (4, 1), and B is with (1, 4). For simplicity, the unit price of good Y is normalized to 1.
  - (a) Derive demand functions for each consumer.
  - (b) Determine the competitive equilibrium.
  - (c) Draw the contract curve in the Edgeworth box and explain the First and Second Fundamental Theorem of Welfare Economics using your diagram.
4. Suppose 100 people are potentially signing up for private insurance with full coverage. Healthy people expect to spend \$100 per year on medical bills, and unhealthy people expect to spend \$1,000. The insurance company is actuarially fair.
  - (a) If the company knows who is healthy and who is unhealthy, what premium would it charge each type?
  - (b) Suppose the insurance company only knows that 70 out of the 100 people are healthy. If everyone signs up for insurance, what is the average expected medical cost per person? Would a private insurance market exist under these conditions?
5. Joe asks you to invest \$1,000 in his small business. If the business succeeds, it earns \$4,000; if it fails, it earns \$800. In either case, Joe promises to give you half of the earnings. If Joe works hard, which costs him \$1,000, the probability of success is 0.7. If he does not work hard, which costs him \$100, the probability of success is 0.2. Would you invest the \$1,000 upfront? (Assume both you and Joe are risk-neutral.)
6. Suppose there are two types of car manufacturers: high-quality (H) and low-quality (L). The expected maintenance cost for a high-quality car is \$150 per year, and for a low-quality car it is \$400 per year. Consumers cannot tell which type of manufacturer is H, but they will regard a manufacturer as H if it offers a 10-year full maintenance warranty for  $\$X$ , and as L if it does not. For this signaling strategy to work, what is the range of values for  $X$ ?