Game Theory 12-03

Exercises: Signaling, Screening, and Dynamic Games

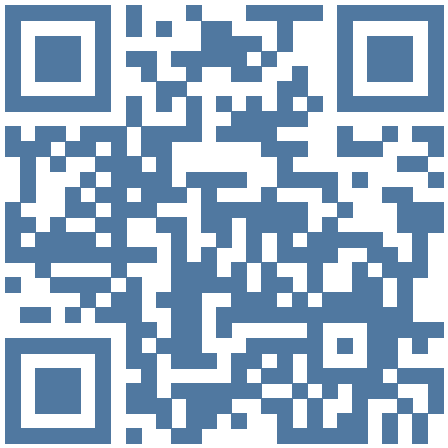
BCSE Game Theory

Jan. 8, 2026

Exercise Session

Signaling, Screening, and Information Cascades

Answer on Google Slides



https://sites.google.com/vju.ac.vn/bcse-gt

- Submit one PDF per team.
- For Q2, show the constraints clearly.
- For Q4, explain the belief update logic step-by-step.

Notes

1. Q1 checks if you understand the Single Crossing Property condition.
2. Q4 involves "Herding" where private information is ignored.

Q1. Signaling (Discrete Choice)

Q1. Education Decision

$\theta \in \{5, 10\}, p = 0.5. e \in \{0, 1\}. c(1, 5) = 4, c(1, 10) = 2. (c(0, \theta) = 0).$

1. **Check Single Crossing Property**:
   - Cost of signaling: $C_L = 4, C_H = 2$. Is $C_L > C_H$ (SCP)?
2. **Separating Equilibrium**:
   - Strategy: High chooses $e = 1$, Low chooses $e = 0$.
   - Wage: $w(1) = 10, w(0) = 5$.
   - Check **IC** for both:
     - Low prefers $(0, 5)$ over $(1, 10)$? $(5 - 0 \geq 10 - 4?)$
     - High prefers $(1, 10)$ over $(0, 5)$? $(10 - 2 \geq 5 - 0?)$
   - Is this an equilibrium?

Q2. Screening (Menu Design)

Q2. Airline Pricing

Types: Business ($\theta_B = 20$), Tourist ($\theta_T = 10$), prob 0.5. $U = \theta q - t$. Cost $C(q) = q^2$. Airline sells: (q_B, t_B) and (q_T, t_T). First Best quality: $q_T = 5, q_B = 10$.

1. Write down the **Participation Constraint (IR)** for the Tourist.
2. Write down the **Incentive Compatibility (IC)** for the Business type.
3. Assume these constraints bind. Solve for optimal prices t_T and t_B.
4. Calculate the Business type's **Information Rent**.

Q3. Reputation (Intuitive)

Q3. The Chain Store Paradox

An Incumbent faces potential Entrants in N markets (one by one). The Incumbent is "Rational" (prefers to Accommodate) but Entrants fear it might be "Crazy" (always Fights).

1. If $N = 1$ (Only 1 market left), what does the Rational Incumbent do? Does the Entrant enter?
2. If $N = 100$ (Long horizon), intuition suggests the Rational Incumbent will **Fight** in early periods (e.g., Market 1 to 90). Why?
3. Explain using the concept of **investing in reputation**. What is the "cost" of fighting today, and what is the "benefit"?

Q4. Information Cascade (Herding)

Q4. Choosing a Restaurant

Restaurants A and B. Prior 50/50. Signal $s \in \{A, B\}$ (70% accurate). Observe actions, not signals.

1. **P1**: Gets $s_1 = A$. What does she choose?
2. **P2**: Sees P1 chose A. Gets $s_2 = A$. What does he choose?
3. **P3**: Sees P1 and P2 chose A. Gets $s_3 = B$.
   - P3 infers P1, P2 signals. Info set: Two A signals vs One B signal.
   - Which implies higher probability? What does P3 choose?
4. **Result**: Does P3 follow his signal or the herd?

Q5. Signaling vs Screening (Conceptual)

Q5. Who Moves First?

Classify the following scenarios as **Signaling** or **Screening**. Explain your reasoning based on who initiates the action (Informed or Uninformed).

1. **Scenario A**: A student voluntarily takes a difficult Advanced Calculus course (even though it's not required) to demonstrate their mathematical aptitude to future employers.
2. **Scenario B**: A company requires all job applicants to submit an official TOEIC score report. Applicants with low scores are filtered out.