



15.040 Practice Final Exam

The open-book take-home final exam will be similar to this practice test with three problems:

1. *Describe a game having certain features and analyze it.*
2. *Problem that requires you to analyze the equilibria in a game.*
3. *Problem that requires connecting concepts from the course in a given scenario.*

1. Describe a two-player game in which (i) each player regards the strategies as strategic complements, (ii) player A prefers that player B adopts a “more aggressive” strategy and (iii) player B prefers that player A adopts a “less aggressive” strategy.¹

- a. What is each player's reaction curve in your game?
- b. Compute all Nash equilibria in your game given simultaneous moves.
- c. Compute all subgame-perfect equilibria in your game when player A moves first as well as when B moves first.
- d. Which would each player prefer, to move first or to move last?

2. Male elk are known for their battles at the start of mating season. Whenever two males (A and B) meet, they always spar a bit with their antlers but ultimately each makes a choice of whether to back off or to fight to the death. If each backs off, each has 90% probability of finding a mate. If A backs off but B does not, then A has 80% chance of mating while B has 100% chance of mating. If neither backs off, then they fight to the death and only the survivor mates (50% chance of mating).

- a. Describe all Nash equilibria of this game. (Be sure to include the mixed strategy equilibrium.)
- b. Which of these equilibria are evolutionarily stable?

[Practice final exam continues on next page.]

¹ If you can not think of a game satisfying (i)-(iii), then for partial credit answer parts (a)-(d) for some other game, preferably one that we have not studied in the class.

3. In 2020, Sony enjoys a monopoly in the market for video game consoles. Every five years, however, Sony is vulnerable to entry when it introduces a new version of its Playstation console, but Sony has been able to deter entry through its cost advantage due to learning. In particular, by producing much more than the monopoly-optimal quantity in each product cycle (giving up short-run profits), Sony keeps its costs low enough to deter entry in the next cycle.

Also in 2020, your firm has secretly developed a revolutionary new computer chip (based on quantum-tunnel transistors) that will allow you to profitably enter the video game console market in 2025 -- regardless of how much Sony produces in the 2020 product cycle.

Is it better for you to reveal your plans to enter the video game console market now or to keep them secret until 2025? Be sure to indicate whether your answer depends on whether future competition in this market is in strategic substitutes or strategic complements, or other factors.