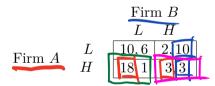# Econ 101 | Demo D1

Demo D1 was given as a MinExam in a previous semester.

Question 1 | Shrake Fishery

The Shrake is a powerfully magical silver-colored fish who's meat is inedible, but carries spines often used as a potent ingredient in potions. There is a great deal of interest in these spines in the magical world. But since their spines easily damage fishing nets, most fishing operations are unable to harvest the fish. Two massive cooperate firms, who for confidentiality reasons we'll call firm A and firm B, have independently developed highly secretive fishing technology to harvest Shrake. Both firms have the ability to harvest vast quantities of Shrake but can make substantial profit even with low harvests. At low capacities the fishery could support both firms, but at high capacities overfishing would lead the declining populations in future seasons. Following these two fishing strategies the profits (in Galleons) for the two firms are summarized by the following payoff matrix.

		Firm B	
		L	H
Firm A	L	10, 6	2, 10
	H	18, 1	3, 3

Q1.A | Best Response

Find the best response for Firm A.

$$BR_A = \begin{cases} H & \text{if } \sigma_B = L \\ H & \text{if } \sigma_B = H \end{cases}$$

Q1.B | Efficient Strategies

Find the efficient strategy pair.

The socially efficient strategies: (H, L)

Q1.C | Nash Equilibrium

Find the Nash Equilibrium.

Nash Eq.: (H, H)

Question 2 | Enforceable Permits

Fearing a total collapse of the Shrake fishery, the Ministry of Magic hired Remus Lupin to develop a policy solution to the looming issue. Remus offered a few proposals, but the policy chosen by the Ministry was to distribute a fishing permit to both firms A and B to harvest at low capacity each season. This would lead to a sustainable population of Shrake into future seasons. Since there are only two firms supplying Shrake, the market is highly visible to regulators making the permits very enforceable. Any firm in violation would be required to pay a fine equal to half of their seasonal profit. The following payoff matrix summarizes the two firms profits after the enforceable permits.

		Firm B	
		L	H
Firm A	L	10, 6	2, 5
	H	9, 1	1.5, 1.5

Q2.A | Best Response

Find the best response for Firm A.

$$BR_A = \begin{cases} L & \text{if } \sigma_B = L \\ L & \text{if } \sigma_B = H \end{cases}$$

Q2.B | Efficient Strategies

Find the efficient strategy pair.

Efficient Strategies: (L, L)

Q2.C | Nash Equilibrium

Find the Nash Equilibrium.

Nash Eq.: (L, L)