Mathematical Economics 2, Problem Set 2

Henry Haustein

Task 1

(a) Total Action (TA): contribution to a public good

$$u_i(\sigma_i, \sigma_1, ..., \sigma_n) = f\left(\sigma_i + \alpha \sum_{j \in N_i} \sigma_j\right) - c\sigma_i$$

Best Effort (BE):

$$u_i(\sigma_i, \sigma_1, ..., \sigma_n) = f\left(\max_{j \in N_i \cup \{i\}} \sigma_j\right) - c\sigma_i$$

Average Effort (AE):

$$u_i(\sigma_i, \sigma_1, ..., \sigma_n) = f\left(\sigma_i \frac{\sum_{j \in N_i} \sigma_j}{k_i}\right) - c\sigma_i$$

Weakest Link (WL): connected banks, one goes bankrupt

$$u_i(\sigma_i, \sigma_1, ..., \sigma_n) = f\left(\min_{j \in N_i \cup \{i\}} \sigma_j\right) - c\sigma_i$$

(b) TA: if the function is concave we get substitutes, if the function is convex we get complements. Property A is satisfied.
BE: strategic substitutes. Property A is satisfied.
AE: strategic complements. Property A is not satisfied.
WL: strategic complements. Property A is not always satisfied.

(c) Table

	All 0	**All 1**
TA	$c \geq b$	$b \geq c$
BE	$c \geq b$	never happen when $n > 1$
AE	always	$b \geq c$,
WL	always	$b \geq c$

(Extra) non-decreasing: If your degree is bigger then a certain k then you play 1 otherwise 0.
non-increasing: If your degree is bigger then a certain k then you play 0 otherwise 1.

- TA: function concave: non-increasing, convex: non-decreasing

- BE: non-increasing

- AE: cannot say because it violates property A

- WL: non-increasing/cannot say because it violates property A

Task 2

(a)