

# Homework 7

Due before 11:59pm (EST), Monday April 27th.

**1.** Consider a game involving a glove market. Players 1 and 2 each have a left-hand glove and player 3 has a right-hand glove. The worth of a coalition is the amount that it will get for the gloves in its possession. Every pair of gloves (left and right) can be sold in the market for \$50. A single glove cannot be sold in the market.

(a) Describe the game in coalition function form.

(b) Compute the Core and the Shapley Value of the game.

(c) Is the Shapley Value in the core?

**2.** Let  $v$  be a simple game on players set  $N$  and let  $T$  be the set of veto players in  $v$ . Show that the Core of a simple game is not empty if and only if there is (at least one) veto player in  $N$ .

**3.** Let  $(N, v)$  be the transferable utility game where  $N = \{1, 2, 3\}$ ,  $v(\{1\}) = v(\{2\}) = v(\{3\}) = 0$  and  $v(\{1, 2\}) = v(\{1, 3\}) = v(\{2, 3\}) = v(\{1, 2, 3\}) = 1$ . Show that the Core of this game is empty, i.e.,  $C(v) = \emptyset$ .

**4.** Calculate the Shapley Value in the following simple majority games:

(a)  $[17; 7, 8, 9, 9]$

(b)  $[10; 7, 5, 4, 3]$