Worksheet 4: Weighted Voting Systems

1. Consider the weighted voting system [35: 10,10,9,5,5]

   (a) How many players are there? _____

   (b) What is the total number (weight) of votes? _____

   (c) What is the quota in this system? _____

   (d) Find all winning coalitions for this system. (Hint: There aren't very many...)

   (e) Is there a dictator? Justify your answer.

   (f) Do any players have veto power? Justify your answer.

   (g) Are there any dummy players? Justify your answer.

   (h) Is it possible to change the quota in this voting system such that it has a dictator? (Note that you are not allowed to change the voting weights.)

2. Five friends decide to start a business. They decide on a weighted voting system where the weight is determined by the number of hours worked per week. Bill worked 15 hours, Tammy worked 8 hours, Dara worked 7 hours, Priyanka worked 3 hours, and Ross worked 2 hours. Any decision that their company makes requires a *majority* of the votes.

   (a) What is the total weight of this voting system?

   (b) What is the quota? (show your work)

   (c) Write the $[q : w_1, w_2, \cdots, w_n]$ notation for this voting system.

   (d) Determine all winning coalitions with *at most 3* players. List the players and the total weight of each coalition. (Hint: There are 10.)

   (e) For each coalition above, circle the players that are *critical* to that coalition.

   (f) Is there a dictator? Justify your answer.

   (g) Do any players have veto power? Justify your answer.

   (h) Are there any dummy players? Justify your answer.

   (i) Is it possible to change the value of the quota such that Bill has veto power? (Note that you are not allowed to change the voting weights.)