

Math in Modern Society
Mathematics of Power
Extra Practice

1. How many dictators can there be in a weighted voting system? Why?
2. If there is a dictator, what number player is this player?
3. If P_1 and P_3 both have veto power, does P_2 have veto power?
4. If P_5 and P_7 are dummies,
 - (a) will P_6 be a dummy?
 - (b) will P_8 be a dummy?

5. Given the weighted voting system:

$$[q : 10, w_2, 7w_4, 5].$$

- (a) What are the possible weights for P_2 ?
 - (b) What are the possible weights for P_4 ?
 - (c) If each player has a different weight, what are the possible weights for P_2 ? P_4 ?
6. If P_1 has veto power, is P_2 a dummy?
7. Can all players have veto power? If so, when will this occur?

8. Given the weighted voting system:

$$[13 : w_1, 9, 2, 1, 1]$$

What are the possible weights for P_1 ?

9. In a weighted voting system, if there are 4 players with the following:

Player 1 has a power index of 40%,
Player 3 has a power index of 30%

- (a) What is the power index of Player 2?
 - (b) What is the power index of Player 4?
10. If there are 5 how many coalitions are there
- (a) using the Banzhaf power index distribution?
 - (b) using the Shapley-Shubik power index distribution?