Section 1.4 Banzhaf Power Index (extra problems)

1. In a weighted voting system with 6 voters, how many possible coalitions are there?

2. Given $[21|10, 8, 5, 3, 2]$, answer the following questions.
   (a) How many voters are there?
   (b) What is the quota?
   (c) What is the total number of possible coalitions?
   (d) Is the coalition $\{P_2, P_3, P_4, P_5\}$ a winning coalition?
   (e) List all of the winning coalitions.
   (f) What do you notice about voter P_1? P_2? P_5?

3. Determine the Banzhaf power index of each voter for $[20|12, 9, 8, 2]$.

4. Determine the Banzhaf power index of each voter for $[12|5, 5, 2, 2]$.

5. Determine the Banzhaf power index of each voter for $[10|6, 5, 4, 2]$.

To Calculate Voters' Banzhaf Power Indices:

STEP 1: Locate all winning coalitions in the weighted voting system.

STEP 2: Determine which voters are critical in each of the winning coalitions.

STEP 3: Calculate each voter's Banzhaf power by adding up the number of times each voter is critical.

STEP 4: Calculate the total Banzhaf power for the weighted voting system by adding all voters' Banzhaf powers.

STEP 5: Determine each voter's Banzhaf power index by dividing his/her Banzhaf power by the total Banzhaf power.