

Key

1. Find the Banzhaf power distribution of the weighted voting system [20: 10, 7, 6, 4, 3].

$$2^5 - 1 = 31 \text{ coalitions}$$

Winning coalitions:

$$\{\underline{P}_1, \underline{P}_2, \underline{P}_3\}$$

$$\{\underline{P}_1, \underline{P}_3, \underline{P}_4\}$$

$$\{\underline{P}_1, \underline{P}_2, \underline{P}_4\}$$

$$\{\underline{P}_1, \underline{P}_2, \underline{P}_5\}$$

$$\{\underline{P}_2, \underline{P}_3, \underline{P}_4, \underline{P}_5\}$$

$$\{\underline{P}_1, \underline{P}_2, \underline{P}_3, \underline{P}_4\}$$

$$\{\underline{P}_1, \underline{P}_2, \underline{P}_4, \underline{P}_5\}$$

$$\{\underline{P}_1, \underline{P}_2, \underline{P}_3, \underline{P}_5\}$$

$$\{\underline{P}_1, \underline{P}_2, \underline{P}_3, \underline{P}_4, \underline{P}_5\}$$

$$\{\underline{P}_1, \underline{P}_3, \underline{P}_4, \underline{P}_5\}$$

$$P_1 \rightarrow \frac{8}{24} = 33.3\%$$

$$P_2 \rightarrow \frac{6}{24} = 25\%$$

$$P_3 \rightarrow \frac{4}{24} = 16.7\%$$

$$P_4 \rightarrow \frac{4}{24} = 16.7\%$$

$$P_5 \rightarrow \frac{2}{24} = 8.3\%$$

Consider the weighted voting system [q: 12, 5, 3, 1].

2. Find the Banzhaf power distribution when q = 14.

$$[14: 12, 5, 3, 1]$$

$$\{ \underline{P_1}, \underline{P_2} \}$$

$$\{ \underline{P_1}, \underline{P_3} \}$$

$$\{ \underline{P_1}, \underline{P_2}, \underline{P_3} \}$$

$$\{ \underline{P_1}, \underline{P_2}, \underline{P_4} \}$$

$$\{ \underline{P_1}, \underline{P_3}, \underline{P_4} \}$$

$$\{ \underline{P_1}, \underline{P_2}, \underline{P_3}, \underline{P_4} \}$$

$$P_1 \rightarrow \frac{6}{11} = 54.5\%$$

$$P_2 \rightarrow \frac{3}{11} = 27.3\%$$

$$P_3 \rightarrow \frac{2}{11} = 18.2\%$$

$$P_4 \rightarrow \frac{0}{11} = 0\%$$