

Key

In each of the following weighted voting systems, determine which players, if any, (i) are dictators; (ii) have veto power; (iii) are dummies.

Coalitions:

1. [13: 14, 8, 3, 1]

$P_1 \rightarrow$  is a dictator (because  $w_1 > q$ ) + has veto power

$P_2, P_3, P_4 \rightarrow$  are dummies

2. [20: 14, 8, 3, 1]

$P_1 \rightarrow$  has veto power because  $14 < 20$  and  $8+3+1 < 20$   
+  $P_2$  (motion can not pass without  $P_1$  votes)

$P_3 + P_4 \rightarrow$  dummy

3. [23: 14, 8, 3, 1]

$P_1 + P_2 \rightarrow$  both have veto power

$$\text{Veto: } w < q \quad v - w < q$$

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Consider the weighted voting system [q: 16, 12, 4].

4. Find the smallest value of q for which all three players have veto power.  $V=32$

$$q = 29$$

5. Find the smallest value of q for which  $P_2$  has veto power but  $P_3$  does not.

$$q = 21$$

6. Find the smallest value of q for which  $P_3$  is the only dummy.

$$q = 28$$

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Consider the weighted voting system [q: 12, 5, 2].  $V=19$

7. Find the smallest value of q for which all three players have veto power.

$$q = 18$$

8. Find the smallest value of q for which  $P_2$  has veto power but  $P_3$  does not.

$$q = 15$$

9. Find the smallest value of q for which  $P_3$  is the only dummy.

$$q = 17$$