

## Allocation Rules and District Magnitude

### Formulae:

Plurality:  $s = v_1$  where  $s$  stands for the number of seats in the district which go to the party that has the highest party vote total ( $v_1 > v_2 > v_3 \dots v_k$ )

Hare:  $q_0 = V/M$  where  $V$  stands for the total votes in a district divided by the number of seats ( $M$ ) to yield the number of votes entitled to a seat ( $q_0$ )

Droop:  $q_1 = V/(M + 1)$  where  $V$  stands for the total votes in a district divided by the number of seats ( $M$ ) plus one to yield the number of votes entitled to a seat ( $q_1$ )

### 1. Question (make sure to show your work):

For a district of  $M = 3$  with four parties competing and a percent vote distribution among them of 41-35-15-9, determine the allocation of seats using the following allocation rules:

	Party A (41%)	Party B (35%)	Party C (15%)	Party D (9%)
Plurality	3	0	0	0
Hare (largest remainders)	1	1	1	0
Droop (largest remainders)	2	1	0	0

### 2. Question (make sure to show your work):

For a district of  $M = 20$  with four parties competing and a percent vote distribution among them of 41-35-15-9, determine the allocation of seats using the following allocation rules:

	Party A (41%)	Party B (35%)	Party C (15%)	Party D (9%)
Plurality	20	0	0	0
Hare (largest remainders)	8	7	3	2
Droop (largest remainders)	8	7	3	2

## Exercise 2 Deviation from Proportionality

### Formula:

Deviation from Proportionality:  $D = (1/2) \sum |s_i - v_i|$  where  $s_i$  is the percentage of seats minus the percentage of votes ( $v_i$ ) and  $\sum$  stands for the summation of all the absolute values divided by two to yield the deviation from proportionality ( $D$ )

### 1. Question (make sure to show your work):

Using your responses from Question 1 in Exercise 1, answer the following (hint convert the number of seats in Exercise 1 into a percentage).

For an electoral system with four parties competing with  $M = 3$  and a percent vote distribution among them of 41-35-15-9, determine the percent seat distribution of the parties and then determine the deviation from proportionality within the electoral system for each of the following allocation rules:

Plurality:  $59 + 35 + 15 + 9 = 118/2 = 59\%$

Hare (largest remainders):  $8 + 2 + 18 + 24 = 52/2 = 26\%$

Droop (largest remainders):  $25 + 2 + 15 + 9 = 51/2 = 25.5\%$

### 2. Question (make sure to show your work):

Using your responses from Question 2 in Exercise 1, answer the following (hint convert the number of seats in Exercise 2 into a percentage).

For an electoral system with four parties competing with  $M = 20$  and a percent vote distribution among them of 41-35-15-9, determine the percent seat distribution of the parties and then determine the deviation from proportionality within the electoral system for each of the following allocation rules:

Plurality:  $59 + 35 + 15 + 9 = 118/2 = 59\%$

Hare (largest remainders):  $1 + 0 + 0 + 1 = 2/2 = 1\%$

Droop (largest remainders):  $1 + 0 + 0 + 1 = 2/2 = 1\%$