

Exercise 5: Algorithm for the distribution of seats

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The algorithm can be found in the 'Bundeswahlleiter, Ergebnisse der Bundestagswahl 2013' (https://www.bundeswahlleiter.de/de/bundestagswahlen/BTW_BUND_13/veroeffentlichungen/BTW2013_Heft3.pdf). The description begins on page 312.

First step:

For each federal land the contingents of seats is calculated. Therefore the number of total seats (598) is divided according to the population of each federal land.

- The population of each federal land is divided by a divisor and the result is rounded.
- The divisor has to be selected in such a way that 598 is the number of total seats.
- The divisor at the beginning is calculated by dividing the population by 598.
- If the distribution of the seats with this beginning divisor is bigger or lower than 598, the divisor value has to be modified. This is possible with an interval of values.
- This interval can be found by dividing the population by the calculated number of seats plus 0.5 and dividing it by the number of seats plus 1.5. If the number of seats is higher than 598, the calculation has to be done with a minus instead of a plus.
- The new divisor has to be between the biggest and the second biggest value in this interval. If the number of seats is higher than 598, the new divisor has to be between the smallest and the second smallest value in the interval.
- The divisor should be a smooth value.

Second step

The contingents of seats are allocated to the parties in each federal land according to the number of 'Zweitstimmen'. (The contingents of seats for each federal land have to be complied with.)

- The divisor at the beginning is chosen by dividing the number of 'Zweitstimmen' by the seat contingent of the federal land.
- If the calculation with this divisor does not lead to the needed number of seats, the divisor has to be modified like before.
- For each party the maximum of the calculated seats and the number of won 'Wahlkreise' is calculated.
- For each party this maximum is summed up for all federal lands. The result of this is the minimum number of seats this party gets in the 'Bundestag'.

Third step

For each party the seats are calculated, which this party deserves according to the number of 'Zweitstimmen' this party could collect. Also each party has to have the minimum number of seats, which has been calculated in the second step. (In this process the total number of seats can rise.)

- A divisor is generated in order to fulfil den minimum number of seats for each party.
- Only parties are contributed, which have more than five percent of all 'Zweitstimmen' or have won at least three 'Wahlkreise'.

Fourth step

Each candidate, which has won a 'Wahlkreis' has a seats in the 'Bundestag'. The number of seats without these winner candidates is filled from the 'Landesliste' of each party. The number of 'Zweitstimmen' for each federal land and party is divided by a divisor. This divisor has to be chosen in order to guarantee at least the number of won 'Wahlkreisen'.

- The divisor at the beginning is calculated by dividing the sum of 'Zweitstimmen' for a party by the calculated number of seats for this party.
- The number of 'Zweitstimmen' for each federal land and party is divided by this divisor. The maximum of this and the number of won 'Wahlkreisen' is calculated.
- If sum of these maxima is not equal to the calculated number of seats for this party, the divisor has to be modified