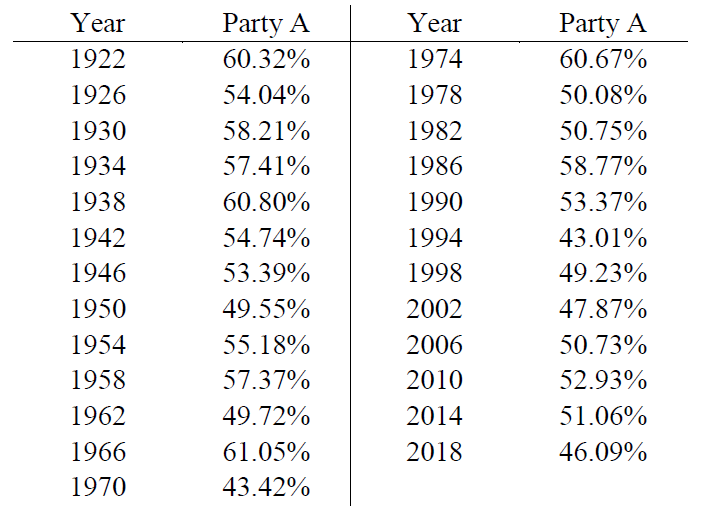
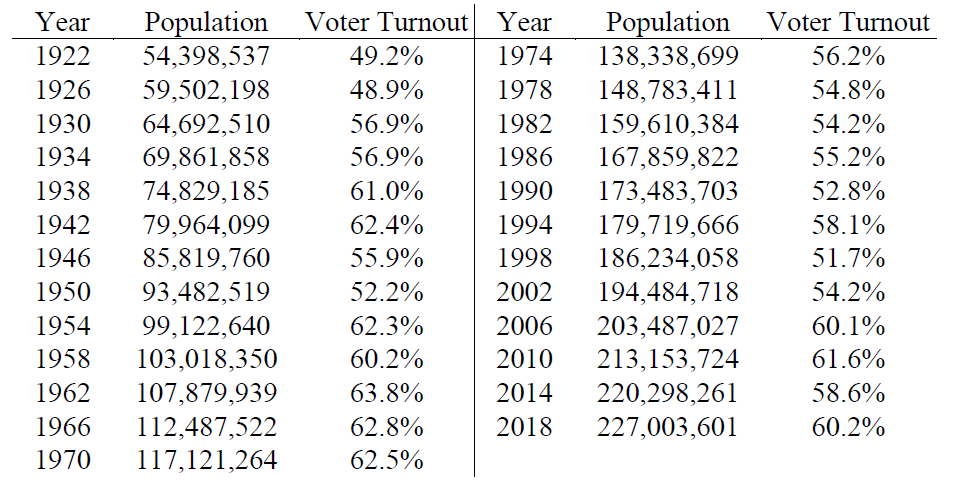
**Question 2**

In the parliament elections of country X, Party A and Party B are the only competitors that have traditionally taken part in it. The election takes place every 4 years. The party that receives more than 50% of the total votes has the majority in the parliament and is hence allowed to rule. The following table shows the percentage (%) of the votes that Party A has received in each election of the last 100 years:



1. Discuss why ARIMA models are not suitable to fit the vote percentage time series (max 100 words). (6 marks)
2. The population in country X over the last 40 years are given below (“Voter turnout” refers to the proportion of population that has voted in the election):



By using these data, apply an appropriate transformation on the time series of received votes in percentage for Party A such that ARIMA models are suitable for fitting here. (14 marks)

1. Determine the most appropriate order of the ARIMA model for the transformed data from (b) using the autocorrelation (ACF) and partial autocorrelation functions. (12 marks)
2. Construct the most suitable ARIMA model based on the finding in (c) on the transformed data from (b). Report the coefficients and the goodness of fit of the model. Compare the goodness of fit of your model with some other possible models. (10 marks)
3. Find the forecasted number of votes for Party A for the next election by applying the model you fitted in (d). (3 marks)
4. Evaluate the following statement (max 200 words):

“The forecasted number of votes calculated in (e) is not helpful since we do not know whether it is the majority or not.” (12 marks)

1. Describe your approach to fit a model on the election results for Party B (max. 200 words). (10 marks)