



# Population processes in the world



# Introduction



# Population power



From the point of view of population power, the most important are countries whose population resources exceed 100 million people.

*"(...) the claim that a state can be considered powerful only because of its population is unfounded, the truth is that no country can maintain or achieve the status of a first-rate power unless it is one of the most populous countries in the world."*

Morgenthau, 2010 Politics Among Nations: The Struggle for Power and Peace



# *Population power*



Identify the countries that were population powers in 1960 and 2023.





# Clusters

The world's population has a characteristic tendency to form large clusters. Currently, there are seven main clusters:

- East Asian
- Southeast Asia,
- Indian
- European,
- North American
- Brazilian
- Nigerian.





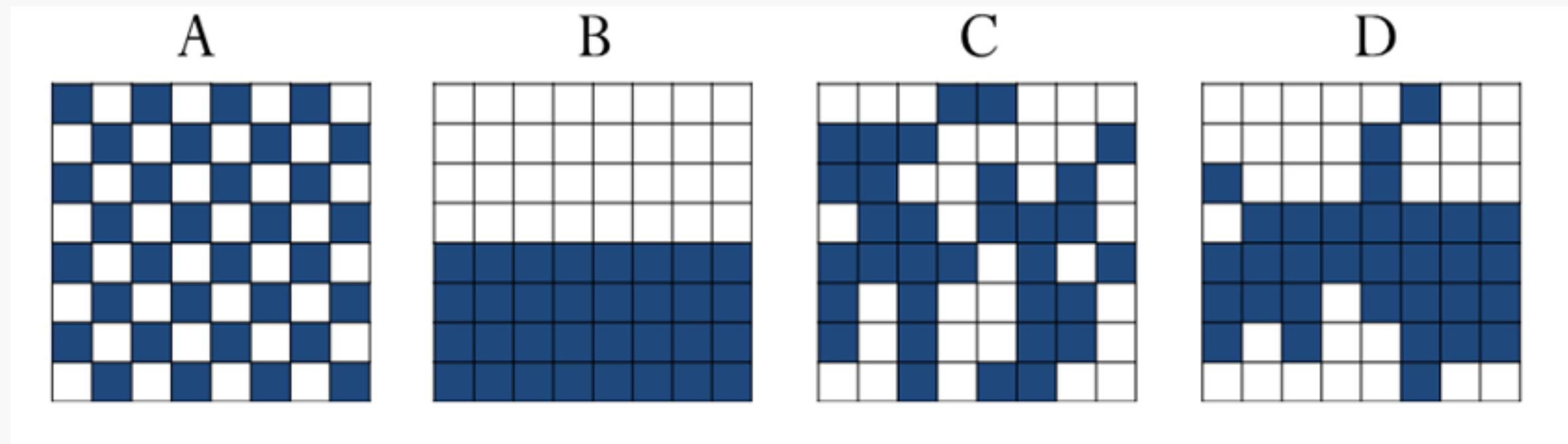
# Population density

Population density is an indicator of the general relationship between a society and its geographical space.

The world's least populated countries include, in particular, those located in polar, desert and semi-arid, high-mountain and tropical regions, as well as small city-states and island nations, and a number of countries located in close proximity to the world's countries.



# *Spatial autocorrelation*







# Moran I



H0:  $\rho=0$ , attribute being analyzed is randomly distributed among th features in your study area

H1:  $\rho\neq 0$ , attribute being analyzed is not randomly distributed among the features in your study area

$$I = \frac{n}{S_o} \cdot \frac{\sum_{i=1}^n \sum_{j=1}^n w_{ij} z_i z_j}{\sum_{i=1}^n z_i^2}$$

# Moran scatter plot

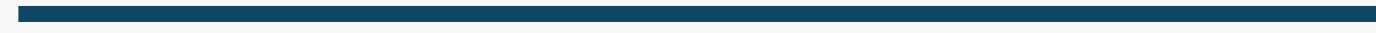


# Exercise

Based on the data from the file "World.shp" and for the **first-order adjacency matrix** (queen type), check if there is spatial autocorrelation for the given variables: population in 2019, population density and degree of urbanization.

In which quadrant of the Moran plot are Poland, Spain and France located?





Thank you!

