

# Problem Set 4

PO 7001 — Quantitative Methods I

Due Date: December 30, 2020, 11:59pm. 100pts total

1. You study the effect of austerity programmes on economic growth. The European Commission hands you the following data about growth in various European countries

Austerity	-0.5	-1.2	1.0	0.1	-0.4
No Austerity	1.1	0.4	1	0.2	0.5

- a. Manually calculate  $W$  from the Wilcoxon rank sum test that countries under austerity programs have the same level of growth as countries without them. Using R, confirm your results and discuss the statistical significance of this statistic [25pts]
- b. Using R, find a 95% confidence interval for the  $W$  you obtained in a, using bootstrapping. [25pts]

2. Economic development and homicide rates in some former Soviet states.

Table 1 gives information on economic development (GDP per capita in 1000 US\$ at PPP) and homicide rates (homicides per 100,000 inhabitants) for a number of former Soviet Union countries in 2004.

We want to regress homicide rates (dependent variable) on GDP (independent variable).

- a. Write down a formula for the equation you want to estimate. [15pts]
- b. Use R to calculate the coefficients, and report R's results. [15pts]
- c. Interpret these coefficients [20pts]

Table 1: Economic development and homicide rates in 2004

Country	GDP	Homicide rate
Belarus	6.970	10.3
Moldova	1.729	8.4
Russia	9.902	21.9
Ukraine	6.394	8
Armenia	4.101	2.3
Azerbaijan	4.153	2.6
Georgia	2.844	6.5
Kazakhstan	7.44	13.9
Kyrgyzstan	1.935	8.3
Tajikistan	1.202	2.1
Turkmenistan	4.315	4
Uzbekistan	1.869	3.7