Instructions: You must answer two of the following three questions. You have a total of three hours to work on your exam. Good luck.

1. **Political career concerns and electoral institutions** Consider the career concerns model in politics. There are 2 periods. The tax rate is fixed at $\tau$. There are only local public goods with no externalities across districts. There are 3 localities $J = 1, 2, 3$ of identical voters with size normalized to 1. The utility of voters in district $J$ is given by,

$$w^J_t = y - \tau + \alpha g^J_t, \alpha \geq 1.$$  

The budget constraint in locality $J$ each period is,

$$g^J_t = \eta^J (\tau - r^J_t), r^J_t \leq \tau < \tau,$$

where rents $r^J_t$ can only be associated with local spending. Competence of the incumbent is given by $\eta^J$ which is uniformly distributed on $[1 - \frac{1}{2\epsilon}, 1 + \frac{1}{2\epsilon}]$. The utility of the politician is given by,

$$E(v) = r_1 + p_1 \delta (R + r_2),$$

where $\delta$ is the discount rate and $p_1$ is the endogenous probability of reelection of the incumbent. The timing of the game is as follows. The incumbent first chooses $r_1$, then $\eta^I$ is realized, with $g^J_1$ determined residually. Then, there are elections. The incumbent keeps his level of competence if reelected. After the elections, $r_2$ is chosen with $g^J_2$ determined residually.

(a) Analyze the benchmark case of decentralization or local district elections where the politician elected by the district can only grab local rents. Derive the total level of period 1 rents in that benchmark case.

(b) Compare this benchmark case with a list system in a case of PR with one single district and 3 seats. Without loss of generality assume that the order on the list is given by the locality index $J = 1, 2, 3$. Derive the probability of reelection of each incumbent and the total period 1 rents of politicians.
2. Conflict and state capacity What are the stylized facts regarding the incidence of internal conflict, external conflict, and state capacity? Describe these facts as precisely as possible (e.g., with attention to measurement aspects), and relate them to the arguments made by Tilly and McNeill in their respective books “Coercion, Capital and European States AD 990-1992,” and “The Pursuit of Power: Technology, Armed Force, and Society Since AD 1000.” Then outline the formal theory in Besley and Persson’s book “Pillars of Prosperity,” and highlight where this formalization succeeds and fails at aligning with the facts and with the arguments by Tilly and McNeill.

3. Voting over a Luxury Public Good Consider a polity with $n$ citizens indexed $i = 1, \ldots n$. Each citizen is endowed with income $y_i$ (where the median income is less than the average income and the individual with the median income is denoted $m$). Each individual $i$ has utility $u_i = u(c_i, g)$ where $c_i$ is her consumption of private goods and $g$ is a public good provided by the government. The government uses a proportional income tax $\tau \in [0, 1]$ to raise revenues that are used to pay for the public good. A unit of the public good costs $p$ units of the private good. The government in this case cannot run a deficit (or save a surplus) so must fully fund public good provision by contemporaneous taxes. The aggregate budget constraint for the economy can then be written as $\sum_i y_i = \sum_i c_i + pg$. In each case discussed below, we assume a utility function such that the public good is a luxury good, in the sense that the marginal utility of the first few units of the private good always exceeds the marginal utility of the public good.

(a) Let $u(c, g) = 2\sqrt{c} + g$. Derive the optimal tax rate for individual $i$. Do the rich prefer a larger tax rate because the public good is a luxury good?

(b) Suppose that simple majority voting is applied. How does an increase in income inequality affect the level of the equilibrium tax?

(c) Now let $u(c, g) = 2 \ln(c) + g$. Derive the optimal tax rate for individual $i$. Do the rich prefer a larger tax rate because the public good is a luxury good?

(d) Suppose that simple majority voting is applied. How does an increase in income inequality affect the level of the equilibrium tax? Compare the results to the first case and discuss what may be the implications.