Instructions: Please answer all questions in the blue books. You may not use notes, books, or calculators. Please show your work. There are eight questions, for a total of 100 points. Questions vary in their level of difficulty. I have tried to put harder questions at the end. Partial credit will be given for partially correct answers. Good luck!

1) [10 points] Suppose that in the year 2010, scientists discover that all possible useful inventions have already been invented. Unlike times in the past when people have made similar pronouncements, this time it is definitely true. What would the optimal response of patent policy to this discovery be? Explain your reasoning in two or three sentences.

2) [10 points] The case of North and South Korea is frequently cited as an example of how the system of government affects economic outcomes. Another case one might want to cite in this regard is Cuba (authoritarian communist government) vs. Costa Rica (democratic, market economy). Explain why the former case is more appealing in terms of economic inference than the latter. Your answer should focus on the single most important reason why the first is preferred to the second. You should not give a laundry list of potential reasons.

3) [10 points] In class it was mentioned that one source of inefficiency is taxation. Consider specifically the case of taxation of wage income, which is the largest component of government revenue in most developed countries. What is the relationship between the amount of inefficiency induced by a tax that raises a given level of revenue, on the one hand, and the elasticity of labor supply, on the other? Explain. Your answer should be 3-4 sentences long. You may draw a picture if that helps.
4) [15 points] Consider two countries described by the model of technology spillovers in Chapter 8. The two countries have equal sized labor forces. Initially, Country X has a higher value of $\gamma_d$ than does country Z. The values of $\gamma_d$ have been constant for a long period of time. Suddenly at time $t$, country X lowers its value of $\gamma_d$ to below that of country Z, while country Z holds its value of $\gamma_d$ constant.

Draw a picture with time on the horizontal axis and the growth rate of $A$ on the vertical axis. Draw lines showing how the growth rates of $A$ in each country change over time, starting before time $t$ and continuing as they approach a new steady state. Note that this is not the standard picture that we have been drawing in class. Be as careful as you can in indicating when growth in a country is rising, falling, or flat; when it jumps; and so on.

5) [15 points] A policy-maker in a developing country reads in the Weil textbook that monopolies are a source of inefficiency. She observes that a particular industry in her own country is dominated by a single firm that is earning monopoly profits. In order to deal with this problem, she decides to enact a per unit tax on the good in question. The amount of the tax is $\tau$ dollars per unit ($\tau$ can be positive or negative. If it is negative, then it will function as a per-unit subsidy). The receipts of the tax (if it is positive) will be refunded to the population of the country in a non-distortionary fashion. Similarly, if $\tau$ is negative, the cost of the subsidy will be raised from the population in a non-distortionary fashion. Will the efficiency-maximizing value of $\tau$ be positive, negative, or zero? Explain.

6) [10 points] Briefly explain the “helping hand” and “grabbing hand” theories of government regulation. In the case of the study of regulations regarding the creation of new firms that is described in the textbook, how do the authors propose to distinguish between these theories, and what do they find.
7) [15 points] “For many of the questions that are of interest to growth economists, the secret to proper inference is to think like a mad scientist.” Write a short essay (three or four paragraphs) explaining this statement. Your intended audience should be someone who hasn’t taken this course and is not familiar with the jargon of econometrics.

8) [15 points] Consider a country in which there are two sectors, called Sector 1 and Sector 2. The production functions in the two sectors are:

\[ Y_1 = L_1^{1/2} \]
\[ Y_2 = L_2^{1/2} \]

where \( L_1 \) is the number of workers employed in Sector 1 and \( L_2 \) is the number of workers employed in Sector 2. The total number of workers in the economy is \( L = L_1 + L_2 = 8 \). Workers can move freely between sectors.

a. [5 points] If workers gets paid their marginal products, calculate the number of workers employed in each sector \((L_1 \text{ and } L_2)\), and the wage that each worker earns \((w_1 \text{ and } w_2)\).

b. [10 points] Now assume that sector 1 imposes a minimum wage of \( w_1 = \frac{1}{2} \). This will be what workers in sector 1 earn. Now calculate the number of workers employed in each sector \((L_1 \text{ and } L_2)\), and the wage that workers in sector 2 earn \((w_2)\).