EXERCISES
HUMAN CAPITAL, TECHNOLOGY AND PRODUCTIVITY

(1) **Human Capital**
In the slide set titled *Human Capital and Economic Growth*, slide 14 gives the average percent increase in salary caused by each additional year of schooling.
   a) Assume that the wage of someone with no education is 5$ an hour. What is the wage of someone with two years of education? And nine years of education?
   b) What fraction of wages is due to human capital for a worker who has two years of education? And nine years of education?

(2) Country A and Country B differ in their intrinsic health environments. Specifically, for a given level of income per capita, workers in Country A will be healthier than workers in Country B. Suppose we observe that the two countries have the same level of income per capita, but people in Country A are healthier than people in country B. What can we conclude about the aspects of production not related to health in the two countries? Explain, using a diagram.

(3) If human capital in the form of education is an important determinant of income differences between countries, explain why countries that have a very large youth population may have difficulties in increasing their per capita income.

(4) **Technological Progress**
Do the following problems from chapter 16 of Blanchard and Johnson, p324: nos 5 and 6.

(5) **Development Accounting**
The output per worker of a country i is given by $y_i = \bar{A}_i k_i^{\alpha} h_i^{1-\alpha}$, where each variable is as defined in class. Denote $k_i^{\alpha} h_i^{1-\alpha}$ as the index of accumulated factors of production (as seen in class). Using a panel like the one of figure 1 below (next page), draw the following situations:
   a) Compared to Country 2, Country 1 has higher output per worker, higher productivity and less accumulated factors of production.
   b) Compared to Country 2, Country 1 has higher output per worker, more accumulated factors and lower productivity.

(6) Consider the following fictitious observations for Countries 1 and 2. The production function for each country is $y_i = \bar{A}_i k_i^{\alpha} h_i^{1-\alpha}$, with $\alpha = 0.5$.

FIGURE 1. Productivity and factor accumulation (Question 5)

	Country 1	Country 2
y	100	200
k	100	100
h	25	64

a) Calculate the productivity level $\bar{A}_i$ of each country.
b) What would be the output ratio y_1/y_2 if both country's stock of accumulated factors were the same?
c) What would be the output ratio y_1/y_2 if both country's total factor productivity level were the same?

(7) The table below provides real data concerning three countries, all relative to the USA. (For instance, the stock of physical capital per worker k in Mauritius is 29% that of the USA.) Assume that each country's output function is $y_i = \bar{A}_i k_i^\alpha h_i^{1-\alpha}$, with $\alpha = 1/3$.

	y	k	h
Sweden	0.67	0.88	0.91
Mauritius	0.49	0.29	0.67
Jordan	0.22	0.18	0.71

a) In which country does factor accumulation play the largest role in explaining income relative to the USA?
b) In which country does productivity play the largest role?