

*Use a blue book to answer all of the following questions. Use graphs where helpful, and be sure to clearly label them. Neatness and organization count! (Note that the production function for quality answers usually uses both clear sentences and graphs in a neoclassical manner - there are diminishing marginal returns! ) You have until 3:55 PM.*

1. (25%) Assume that Israel has 1 million identical workers, and each worker can produce either 8 units of manufactured goods ( $Q_M$ ) or 6 units of agricultural goods ( $Q_A$ ) under conditions of constant costs (i.e., constant returns to scale, with labor the only factor). Jordan has 2 million workers, and each worker can produce either 3 units of  $Q_M$  or 5 units of  $Q_A$ .
  - a) Putting  $Q_M$  on the horizontal axis, draw and label the PPFs for both Israel and Jordan. What is the marginal rate of transformation for each country?
  - b) Suppose that both countries are autarkies. Using indifference curves, show how you find their choices for their production and consumption combinations, and their autarky price ratios ( $P_M/P_A$ ).
  - c) Which country has the absolute advantage in each good? Which has the comparative advantage?
  - d) Suppose that these countries negotiate a free trade treaty. What would be the patterns of trade? Assuming both countries fully specialize, show the free trade equilibrium (i.e., the production and consumption choices) for both countries.
  - e) Use the Edgeworth distribution box to illustrate how specialization increases total production of X and Y, and how exchange allows both countries to reach a higher level of utility.
  - f) Define  $RQ = (Q_M/Q_A)$  and  $RP = (P_M/P_A)$ . Assume each country always spends half of its income on consumption of each output, so that relative demand in both countries can be written as  $RQ = 1/RP$ . Graph the  $RD/RS$ , labeling carefully, and solve for the equilibrium  $RP$ .
  
2. (20%) Assume instead that Israel and Jordan have identical preferences and access to identical technologies for producing  $Q_M$  and  $Q_A$ . Both sectors require labor, but each also has a specific factor (agriculture requires land, and manufacturing requires capital). Production exhibits constant returns to scale and diminishing marginal products. Israel has 1 million workers, 2 million units of land, and 4 million units of capital; Jordan has 2 million workers, 3 million units of land, and 2 million units of capital.
  - a) For Israel only, use the four-quadrant graph to show how diminishing returns affects the shape of the PPF.
  - b) For Israel only, use the labor allocation graph to show how a simultaneous increase in  $P_M$  and a decrease in  $P_A$  affects the allocation of labor. Assuming that the overall price level is unchanged, what happens to the wage rate, the residual income of landowners, and the residual income of capital owners?
  - c) Which country has the comparative advantage in which product?
  - d) Draw and label the PPFs for both Israel and Jordan, and show both the autarky and free-trade equilibria for both, including autarky price ratios, terms of trade, and the trade triangle. Are both countries better off? You do not need to use indifference curves.
  
3. (20%) Assume that Japan produces two goods, high-tech (X) and low-tech (Y) products, and both

products use only skilled (S) and unskilled (U) labor, though X is relatively S-intensive. Japan is S-abundant, relative to its trade partners, but its preferences, technologies, and factors are otherwise identical.

- a) Suppose that Japan is an autarky. How would its relative price ratio  $P_X/P_Y$  compare to that of its potential trading partners? Using the two-quadrant graph and the Stolper-Samuelson theorem, explain how this would affect Japan's relative wage rate for skilled labor ( $W_S/W_U$ ) and the unskilled-skilled labor ratios in each industry.
- b) Now suppose that Japan is fully engaged in perfect free trade, and it then increases its educational budget so that it now has more S (for simplicity, ignore the fact that Japan will now have less U). how will this affect its PPF? (In your graph, put X on the horizontal axis.) Assuming Japan is a small country in terms of its affect on world markets, how would this affect its production of X and Y? What will happen to the volume of its trade? What will happen to its welfare?
- c) Now suppose Japan is a large country in the world market. How will the increase in S affect its terms of trade? How will this affect the relative wage rate for skilled labor in Japan?
- d) Could Japan's growth be immiserizing? If so, what conditions would need to be met?
- e) Assuming Japan is a large country, how will its increase in S affect its trading partners, i.e., the volume of their trade, their relative wage rate for skilled labor, and their overall welfare?

4. (10%) Consider the neoclassical assumption of constant returns to scale, and explain how economies of scale affect the trade model. Are there still benefits from trade? Explain, compare and contrast (a) internal economies with (b) external economies. In which case is monopoly power more likely, and how does international trade affect monopolies? In which case might free trade prevent a small developing country from specializing in a good with a potential comparative advantage?

5. (15%) Briefly explain briefly the major assumptions behind the Krugman-Obstfeldt model of monopolistic competition, explain what determines the slopes of both the CC and PP curves, and give the equations. Next, assume there are two countries, Large and Small, where Large has a market size twice that of Small but technologies, factor prices, and market conditions are otherwise similar. Show each country's autarky equilibrium, and then explain how the price, average firm size, and the total number of firms changes when these countries open up free trade. How does free trade in this good affect consumer welfare, in terms of the price and variety of goods available from this sector in each country? Will one country come to dominate the market, or will there be intra-industry trade?

6. (10%) Consider the incentives to save and invest in two countries, Japan and China. Japan is a mature market economy with a large capital stock and diminishing marginal returns for investors, while China is a small emerging economy with a high marginal return on investment. Assume preferences between current and future consumption are identical. Using a model of intertemporal trade (i.e., PPFs and indifference curves), show the autarky amount of savings and investment for both countries. If savings were allowed to flow internationally, which direction would it flow, and what would happen to domestic savings, investment, and future output in each country? Which country would have a current surplus in trade (exports minus imports), and which would have a deficit?

END

Graduate Student Addition (Take-Home)

7. For the case of Japan in Problem #3:

- a) Show an Edgeworth allocation box, with skilled labor on the horizontal axis and high-tech goods (X) on the southwest origin. Explain the contract curve, and show that the autarky equilibrium lies on this curve. Show the equilibrium relative wage rate for skilled labor.
- b) Using a second Edgeworth box, show how specialization affects the allocation of labor, the unskilled/skilled labor ratio, and the relative wage for skilled labor.
- c) Using a third Edgeworth box, show how an increase in the amount of skilled labor  $S$  affects the allocation of labor, assuming that Japan is a small economy.
- d) Using a fourth Edgeworth box, show how your answer to (c) would differ if Japan were a large country in world markets. Show how the increase in skilled labor would affect the allocation of labor, the skilled/unskilled labor ratios in each sector, and the relative wage rate for skilled labor.