SS 2014, 2nd

Please answer all questions

1. Consider the two-country Ricardian model with a continuum of goods (Dornbusch, Fischer, Samuelson, 1977). The unit labor requirement in the home country is given by $a(z)$, that in the foreign country by $a^*(z)$, with $0 \leq z \leq 1$. The goods are ranked from 0 to 1 by home country comparative advantage, so that $A(z) \equiv a^*(z)/a(z)$, $A\prime(z) < 0$. The wages in home and foreign are denoted by w and w^*, respectively. The home country has L workers, foreign has L^*. Workers in both countries provide one unit of labor each, and have identical Cobb-Douglas preferences. Assuming that in equilibrium home produces all goods between 0 and $\tilde{z}$, the fraction of income spent on home's good is given by $\phi(\tilde{z})$ with $\phi'(\tilde{z}) > 0$. The free-trade equilibrium is characterized by the following two conditions:

$$\begin{aligned}\frac{w}{w^*} &= A(\tilde{z}) \\ \frac{w}{w^*} &= \frac{\phi(\tilde{z})}{1-\phi(\tilde{z})}\frac{L^*}{L}\end{aligned}$$

   (a) Explain the economic meaning of each equilibrium condition.

   (b) Use Cramer's Rule to prove formally how a marginal increase in L^*/L affects $\tilde{z}$ and $\frac{w}{w^*}$. For simplicity define $B(\tilde{z}) \equiv \frac{\phi(\tilde{z})}{1-\phi(\tilde{z})}$ with $B'(\tilde{z}) > 0$.

   (c) Now use a diagram with $\tilde{z}$ on the horizontal and $\frac{w}{w^*}$ on the vertical axis, to explain how an increase in L^*/L would change the equilibrium. Discuss the economic reason for these changes.

2. The gravity equation allows for a simple characterization of bilateral trade between countries i and j. The basic gravity equation can be written as

$$X^{ij} + X^{ji} = \left(\frac{2}{Y^w}\right) Y^i Y^j,$$

   where X^{ij} denotes exports from i to j, Y^i is the GDP of country i, and Y^w is world GDP.

   (a) Derive this gravity equation and explain the assumptions you have to make.

   (b) The monopolistic competition model of international trade provides a possible theoretical foundation for the use of the gravity equation. Explain which feature of the monopolistic competition model accounts for this.

3. Consider the two-good, two-factor model discussed in class, and assume that industry 1 is labor intenstive:

$$\frac{a_{1L}}{a_{1K}} > \frac{a_{2L}}{a_{2K}}.$$

To prove the Stolper-Samuelson Theorem assume that factor-price insensitivity holds so that the relationship between factor and commodity prices is given by the following two zero-profit conditions:

$$\begin{aligned} c_1(w,r) &= p_1 \\ c_2(w,r) &= p_2 \end{aligned}$$

(a) Totally differentiate the two zero-profit conditions, taking into account Shepard's Lemma ($\partial c_i/\partial w = a_{iL}, \partial c_i/\partial r = a_{iK}$).

(b) Assume that $dp_1 = 0$ and $dp_2 \neq 0$. Use Cramer's Rule to derive the signs of dw/dp_2 and dr/dp_2.

(c) Suppose that the production functions of industries 1 and 2 are $Q_1 = K_1^{0.3}L_1^{0.7}$ and $Q_2 = K_2^{0.6}L_2^{0.4}$, respectively. Determine formally that industry 1 is labor intensive, that is, uses the lower capital/labor ratio for given relative factor prices.

(d) Depict the cone of diversification in a diagram. Explain why factor-price insensitivity does not hold when the endowment vector is outside this cone.