

Note: You would require a calculator to do Question 1 d).

1. Country A and country B both have the following production function

$$Y = F(K, L) = K^{\frac{1}{2}}L^{\frac{1}{2}}$$

- a Does this production function have constant returns to scale? Explain
- b What is the per-worker production function $y = f(k)$?
- c *Steady State:* Assume that neither country has population growth or technological progress and that 5 percent of capital depreciates every year. Assume further that country A saves 10 percent of output each year and country B saves 20 percent of the output each year. Use your answer from part a and b and the steady state condition to find the steady state level of capital per worker for each country. Then find the steady-state levels of income per worker and consumption per worker.
- d *Growth path:* Suppose that both countries start off with a capital stock per worker of 2. What are the levels of income per worker and consumption per worker in the two countries? Use a calculator to show how the capital stock per worker, consumption per worker and income per worker will evolve over time in both countries. How many years will it be before the consumption in country B is higher than the consumption in country A?
2. Demonstrate that if the production function is $Y = F(K, AL)$, the prices of factors / inputs satisfy the following conditions:

$$r = f'(k) - \delta$$

$$w = A[f(\tilde{k}) - \tilde{k}f'(\tilde{k})]$$

where $\tilde{k} = \frac{K}{AL}$; $\tilde{y} = \frac{Y}{AL} = f(\tilde{k})$ and δ is the depreciation rate.

Note: Please try to make the connection between this question and the figure in Worksheet 1.