ECON2113 Macroeconomics

Chapter 3 Exercises

1. Suppose output is growing at 3% per year and capital's and labor's shares of income are .3 and .7, respectively.
    a. If both labor and capital grow at 1% per year, what would the growth rate of total factor productivity have to be?
    b. What if both the labor and the capital stocks are fixed?

2. Suppose an earthquake destroys one-quarter of the capital stock. Discuss the adjustment process of the economy, and using the figure on P19 of lecture notes, show what happens to growth in the short run and in the long run.

3. Suppose there is an increase in the population growth rate.
    a. Show graphically how this affects the growth rate of both output per capita and total output in the short and long run. (*Hint*: Use a diagram like the one on P19 of lecture notes.)
    b. Chart the time paths of per capita income and the per capita capital stock following this change. (*Hint*: Use a diagram like the one on P20 of lecture notes.)

4. Consider the following production function: $Y = K^{.5}(AN)^{.5}$, where both the population and the pool of labor are growing at a rate $n = .07$, the capital stock is depreciating at a rate $d = .03$, and A is normalized to 1.
    a. What are capital's and labor's shares of income?
    b. What is the form of this production function?
    c. Find the steady-state values of k and y when $s = .20$.
    d. At what rate is per capita output growing at the steady state? At what rate is total output growing? What is total factor productivity is increasing at a rate of 2% per year ($g = .02$)?

5. Suppose the level of technology is constant. Then it jumps to a new, higher constant level.
    a. How does this technological jump affect output per head, holding the capital-labor ratio constant?
    b. Show the new steady-state equilibrium. What has happened to per capita saving and

the capital-labor ratio? What happens to output per capita?

c. Chart the time path of the adjustment to the new steady state. Does the investment ratio rise during transition? If so, is the effect temporary?