Some Practice Problems

1. It is sometimes argued that the wartime destruction of capital goods stimulated the post-World War II economic growth in Japan and Germany. Is this a plausible result? Does it follow that losing a war is an economic benefit?

2. In the data, is average labor productivity pro-cyclical or counter-cyclical. From this observation can you conclude that supply shocks are the primary-driving force behind business cycle fluctuations?

3. A consumer has preferences $E \sum_{t=0}^{\infty} \beta^{\frac{1}{2}}(c_t^\gamma)$, where $\gamma < 1$ and $\gamma \neq 0$. She begins with consumption $c > 0$ in period 0. Every period thereafter her consumption either doubles or halves, each with probability $1/2$. (i.e. in period 1 she consumes either $2c$ or $(1/2)c$, and so on.) Express the consumer’s expected utility $v(c)$ as a function of $c$.

4. In his paper “Indivisible Labor and the Business Cycle,” Gary Hansen assumed that consumers have the current period utility function: $u(c_t, 1-h_t) = \ln c_t + A \ln(1-h_t)$. Suppose that instead he had assumed preferences of the form:

$$u(c_t, 1-h_t) = \frac{1}{1-\sigma} \left[ c_t (1-h_t)^A \right]^{1-\sigma}$$

where $\sigma > 1$.

(a) How would this change have affected the amplitude of output (as Hansen measures it in his Table 1) predicted by the divisible labor model? Explain.

(b) How would it have affected the amplitude of output in the indivisible labor version? Explain.

5. Consider the following deterministic growth model

$$\max_{c_t, k_{t+1}} \sum_{t=0}^{\infty} \beta^t ln(c_t)$$

subject to:

$$c_t + k_{t+1} = Ak_t^\alpha.$$ 

(a) Write the functional equation for the optimal growth problem stated above. Show that the value function has the form $v(k) = A + D ln(k)$. Find the value of $D$.

(b) What is the economic interpretation of the value function?

(c) Compute the optimal decision rules for saving and consumption. Find the optimal growth rate of the capital stock.

(d) What is the price of capital (in terms of the consumption good) in this model?

(e) Consistently over the last 140 years, the United States has grown on average 3% per year. Can this model explain this fact? Why or why not?