Name: _____ Date: _____

1. Starting from a steady-state situation, if the saving rate increases, the rate of growth of capital per worker will:
   A) increase and continue to increase unabated.
   B) increase until the new steady state is reached.
   C) decrease until the new steady state is reached.
   D) decrease and continue to decrease unabated.

2. If the production function is $Y = AK^{2/3}L^{1/3}$ in the land of Solovia, and the labor force increases by 5 percent while capital is constant, labor productivity will:
   A) increase by 3.33 percent.
   B) increase by 1.67 percent.
   C) decrease by 1.67 percent.
   D) decrease by 3.33 percent.

3. In the Solow growth model, the assumption of constant returns to scale means that:
   A) all economies have the same amount of capital per worker.
   B) the steady-state level of output is constant regardless of the number of workers.
   C) the saving rate equals the constant rate of depreciation.
   D) the number of workers in an economy does not affect the relationship between output per worker and capital per worker.

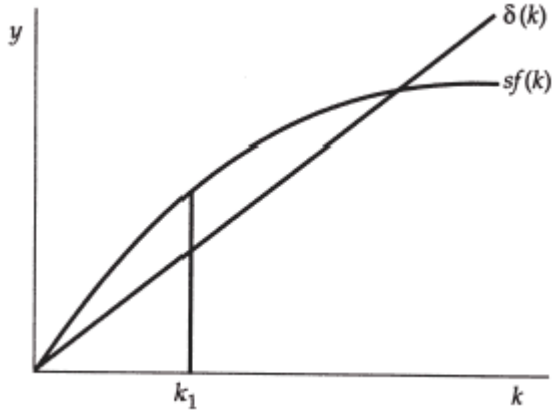
4. In a Solow model with technological change, if population grows at a 2 percent rate and the efficiency of labor grows at a 3 percent rate, then in the steady state output per effective worker grows at a _____ percent rate.
   A) 0
   B) 2
   C) 3
   D) 5

5. If capital grows at 3 percent per year and labor grows at 1 percent per year, and capital's share is 1/3 while labor's share is 2/3, if there is no technological progress and the neoclassical assumptions hold, the growth rate of output will be:
   A) 1-1/3 percent per year.
   B) 1-2/3 percent per year.
   C) 3 percent per year.
   D) 2-1/3 percent per year.

6. If the national saving rate increases, the:
   A) economy will grow at a faster rate forever.
   B) capital-labor ratio will increase forever.
   C) economy will grow at a faster rate until a new, higher, steady-state capital-labor ratio is reached.
   D) capital-labor ratio will eventually decline.

7. In the Solow growth model, an economy in the steady state with a population growth rate of n but no technological growth will exhibit a growth rate of output per worker at rate:
   A) 0
   B) n
   C) δ
   D) $(n + \delta)$

8. (Exhibit: The Capital-Labor Ratio) In this graph, starting from capital-labor ratio k_1, the capital-labor ratio will:



   A) decrease.
   B) remain constant.
   C) increase.
   D) first decrease and then remain constant.

9. A reduction in the saving rate starting from a steady state with more capital than the Golden Rule causes investment to _____ in the transition to the new steady state.
   A) increase
   B) decrease
   C) first increase, then decrease
   D) first decrease, then increase

10. Assume that a country's per-worker production is $y = k^{1/2}$, where y is output per worker and k is capital per worker. Assume also that 10 percent of capital depreciates per year (= 0.10).
    a. If the saving rate (s) is 0.4, what are capital per worker, production per worker, and consumption per worker in the steady state? (*Hint:* Use $sy = \delta k$ and $y = k^{1/2}$ to get an equation in s, δ, k, and $k^{1/2}$, and then solve for k.)
    b. Solve for steady-state capital per worker, production per worker, and consumption per worker with $s = 0.6$.
    c. Solve for steady-state capital per worker, production per worker, and consumption per worker with $s = 0.8$.
    d. Is it possible to save too much? Why?

11. If $Y = K^{0.3}L^{0.7}$, then the per-worker production function is:
    A) $Y = F(K/L)$.
    B) $Y/L = (K/L)^{0.3}$.
    C) $Y/L = (K/L)^{0.5}$.
    D) $Y/L = (K/L)^{0.7}$.

12. The Golden Rule level of capital accumulation is the steady state with the highest level of:
    A) output per worker.
    B) capital per worker.
    C) savings per worker.
    D) consumption per worker.

13. If Y is output, K is capital, u is the fraction of the labor force in universities, L is labor, and E is the stock of knowledge, and the production $Y = F(K,(1? u) EL)$ exhibits constant returns to scale, then output (Y) will double if:
    A) K is doubled.
    B) K and u are doubled.
    C) K and E are doubled.
    D) L is doubled.

14. If an economy with no population growth or technological change has a steady-state MPK of 0.125, a depreciation rate of 0.1, and a saving rate of 0.225, then the steady-state capital stock:
    A) is greater than the Golden Rule level.
    B) is less than the Golden Rule level.
    C) equals the Golden Rule level.
    D) could be either above or below the Golden Rule level.

15. The Solow growth model describes:
    A) how output is determined at a point in time.
    B) how output is determined with fixed amounts of capital and labor.
    C) how saving, population growth, and technological change affect output over time.
    D) the static allocation, production, and distribution of the economy's output.

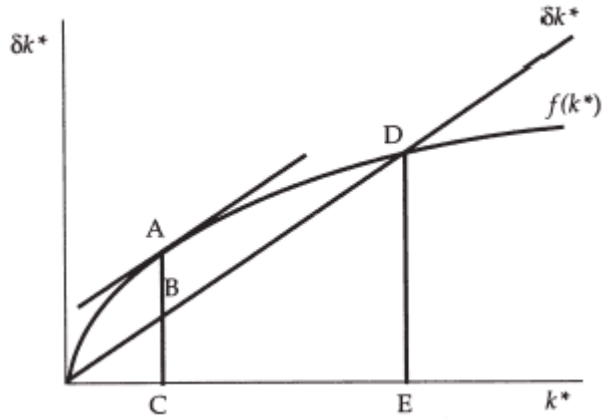
16. (Exhibit: Factors of Production Data)

Period	Y	K	L	Share of Labor in Output
1	100	200	100	0.5
2	106	205	102	0.5
3	111	210	104	0.5
4	110.5	215	104	0.5
5	110	220	104	0.5

Use the data in the exhibit to complete a and b.
a. Compute and report the value of growth in total factor productivity $((A_t - A_{t-1})/A_{t-1})$ in each period from periods 2 through 5. If the value of A is 1.000 in period 1, also report the value of A in each period.
b. Does the value of A rise in each period? If it declines, do you think this decline is because technological progress works backwards? If so, explain your answer. If not, provide another explanation.

17. If capital lasts an average of 25 years, the depreciation rate is _____ percent per year.
    A) 25
    B) 5
    C) 4
    D) 2.5

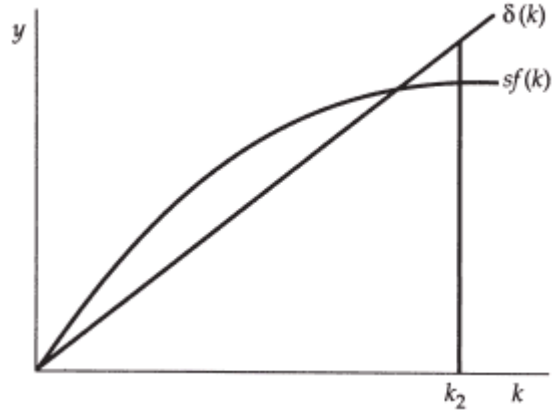
18. (Exhibit: Steady-State Consumption II) The Golden Rule level of steady-state consumption per worker is:



A) AC.
B) AB.
C) BC.
D) DE.

19. If the per-worker production function is given by $y = k^{1/2}$, the saving rate (s) is 0.2, and the depreciation rate is 0.1, then the steady-state ratio of capital to labor is:
A) 1.
B) 2.
C) 4.
D) 9.

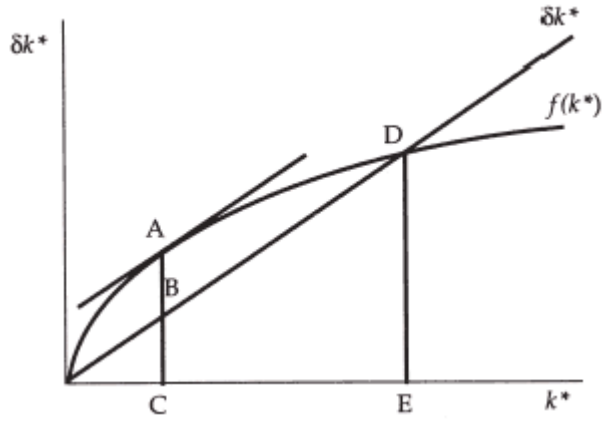
20. (Exhibit: Capital-Labor Ratio and the Steady State) In this graph, capital-labor ratio k_2 is not the steady-state capital-labor ratio because:



A) the saving rate is too high.
B) the investment ratio is too high.
C) gross investment is greater than depreciation.
D) depreciation is greater than gross investment.

21. With population growth at rate n and labor-augmenting technological progress at rate g, the Golden Rule steady state requires that the marginal product of capital (*MPK*):
    A) net of depreciation be equal to $n + g$.
    B) net of depreciation be equal to the depreciation rate plus $n + g$.
    C) plus n be equal to the depreciation rate plus g.
    D) plus g be equal to the depreciation rate plus n.

22. (Exhibit: Steady-State Consumption II) The Golden Rule level of steady-state investment per worker is:



    A) AC.
    B) AB.
    C) BC.
    D) DE.

23. The recent worldwide slowdown in economic growth began in the early:
    A) 1960s.
    B) 1970s.
    C) 1980s.
    D) 1990s.

24. Assume that two countries both have the per-worker production function $y = k^{1/2}$, neither has population growth or technological progress, depreciation is 5 percent of capital in both countries, and country A saves 10 percent of output whereas country B saves 20 percent. If A starts out with a capital-labor ratio of 4 and B starts out with a capital-labor ratio of 2, in the long run:
    A) both A and B will have capital-labor ratios of 4.
    B) both A and B will have capital-labor ratios of 16.
    C) A's capital-labor ratio will be 4 whereas B's will be 16.
    D) A's capital-labor ratio will be 16 whereas B's will be 4.

25. In a steady-state economy with a saving rate s, population growth n, and labor-augmenting technological progress g, the formula for the steady-state ratio of capital per effective worker (k^*), in terms of output per effective worker ($f(k^*)$), is (denoting the depreciation rate by δ):
A) $sf(k)/(\delta + n + g)$.
B) $s/((f(k))(\delta + n + g))$.
C) $f(k)/((s)(\delta + n + g))$.
D) $(s - f(k))/(\delta + n + g)$.

26. The economy of Alpha can be described by the Solow growth model. The following are some characteristics of the Alpha economy:

saving rate (s)	.20
depreciation rate (δ)	.12
steady-state capital per worker (k)	4
population growth rate (n)	.02
steady-state output per worker	20,000

a. What is the steady-state growth rate of output per worker in Alpha?
b. What is the steady-state growth rate of total output in Alpha?
c. What is the level of steady-state consumption per worker in Alpha?
d. What is the steady-state level of investment per worker in Alpha?

27. According to the Solow model, persistently rising living standards can only be explained by:
A) population growth.
B) capital accumulation.
C) saving rates.
D) technological progress.

28. Assume two economies are identical in every way except that one has a higher saving rate. _____ According to the Solow growth model, in the steady state the country with the higher saving rate will have _____ level of total output and _____ rate of growth of output per worker as/than the country with the lower saving rate.
A) the same; the same
B) the same; a higher
C) a higher; the same
D) a higher; a higher

29. If a war destroys a large portion of a country's capital stock but the saving rate is unchanged, the Solow model predicts output will grow and that the new steady state will approach:
A) a higher output level than before.
B) the same output level as before.
C) a lower output level than before.
D) the Golden Rule output level.

30. With population growth at rate n but no technological change, the Golden Rule steady state may be achieved by equating the marginal product of capital (MPK):
A) net of depreciation to n.
B) to n.
C) net of depreciation to the depreciation rate plus n.
D) to the depreciation rate.

31. If the U.S. production function is Cobb-Douglas with capital share 0.3, output growth is 3 percent per year, depreciation is 4 percent per year, and the capital-output ratio is 2.5, the saving rate that is consistent with steady-state growth is:
A) 12.5 percent.
B) 14 percent.
C) 17.5 percent.
D) 20 percent.

32. With a per-worker production function $y = k^{1/2}$, the steady-state capital stock per worker (k^*) as a function of the saving rate (s) is given by:
A) $k^* = (s/\delta)^2$.
B) $k^* = (\delta / s)^2$.
C) $k^* = s/ \delta$.
D) $k^* = \delta / s$.

33. If $y = k^{1/2}$, there is no population growth or technological progress, 5 percent of capital depreciates each year, and a country saves 20 percent of output each year, then the steady-state level of capital per worker is:
A) 2.
B) 4.
C) 8.
D) 16.

34. In a Solow model with technological change, if population grows at a 2 percent rate and the efficiency of labor grows at a 3 percent rate, then in the steady state total output grows at a _____ percent rate.
A) 0
B) 2
C) 3
D) 5

35. Two economies are identical except that the level of capital per worker is higher in Highland than in Lowland. The production functions in both economies exhibit diminishing marginal product of capital. An extra unit of capital per worker increases output per worker:
A) more in Highland.
B) more in Lowland.
C) by the same amount in Highland and Lowland.
D) in Highland, but not in Lowland.

36. If the production function is $y = k^{1/2}$, the steady-state value of y is:
A) $y = ((s + g)/(\delta + n))^{1/2}$.
B) $y = (s + g)/(\delta + n)$.
C) $y = (2/(\delta + n + g))^{1/2}$.
D) $y = s/(\delta + n + g)$.

37. If the U.S. production function is Cobb-Douglas with capital share 0.3, output growth is 3 percent per year, depreciation is 4 percent per year, and the Golden Rule steady-state capital-output ratio is 4.29, to reach the Golden Rule steady state, the saving rate must be:
A) 17.5 percent.
B) 25 percent.
C) 30 percent.
D) 42.9 percent.

38. In the Solow growth model of Chapter 7, where s is the saving rate, y is output per worker, and i is investment per worker, consumption per worker (c) equals:
A) sy
B) $(1 - s)y$
C) $(1 + s)y$
D) $(1 - s)y - i$

39. Suppose Congress passes significant tax cuts on household income but does not reduce spending, so that the government budget deficit is larger. Use the Solow growth model of Chapter 8 to graphically illustrate the impact of the tax cut on the steady-state capital-labor ratio and the steady-state level of output per worker. Be sure to label the: a. axes; b. curves; c. initial steady-state levels; d. terminal steady-state levels; and e. the direction curves shift.

40. In an economy with population growth at rate n, the change in capital stock per worker is given by the equation:
    A) $\Delta k = sf(k) + \delta k$.
    B) $\Delta k = sf(k) - \delta k$.
    C) $\Delta k = sf(k) + (\delta + n)k$.
    D) $\Delta k = sf(k) - (\delta + n)k$.

41. Two countries, Highland and Lowland, are described by the Solow growth model. Both countries are identical, except that the rate of labor-augmenting technological progress is higher in Highland than in Lowland.
    a. In which country is the steady-state growth rate of output per effective worker higher?
    b. In which country is the steady-state growth rate of total output higher?
    c. Does the Solow growth model predict that the two economies will converge to the same steady state?

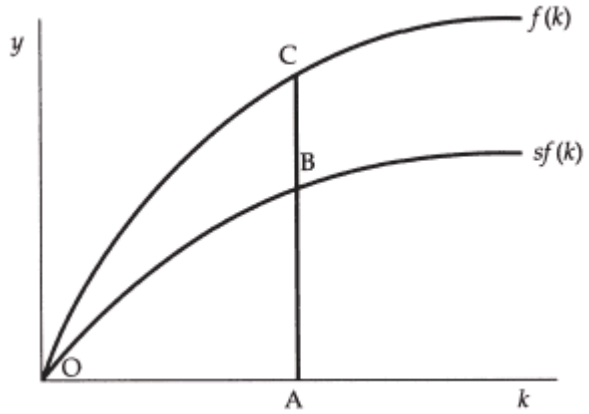
42. In the Solow growth model of Chapter 7, the economy ends up with a steady-state level of capital:
    A) only if it starts from a level of capital below the steady-state level.
    B) only if it starts from a level of capital above the steady-state level.
    C) only if it starts from a steady-state level of capital.
    D) regardless of the starting level of capital.

43. When $f(k)$ is drawn on a graph with increases in k noted along the horizontal axis, the:
    A) graph is a straight line.
    B) slope of the line eventually gets flatter and flatter.
    C) slope of the line eventually becomes negative.
    D) slope of the line eventually becomes steeper and steeper.

44. If $y = k^{1/2}$, the country saves 10 percent of its output each year, and the steady-state level of capital per worker is 4, then the steady-state levels of output per worker and consumption per worker are:
A) 2 and 1.6, respectively.
B) 2 and 1.8, respectively.
C) 4 and 3.2, respectively.
D) 4 and 3.6, respectively.

45. Suppose an economy is initially in a steady state with capital per worker exceeding the Golden Rule level. If the saving rate falls to a rate consistent with the Golden Rule, then in the transition to the new steady state consumption per worker will:
A) always exceed the initial level.
B) first fall below then rise above the initial level.
C) first rise above then fall below the initial level.
D) always be lower than the initial level.

46. (Exhibit: Output, Consumption, and Investment) In this graph, when the capital-labor ratio is OA, AB represents:



A) investment per worker, and AC represents consumption per worker.
B) consumption per worker, and AC represents investment per worker.
C) investment per worker, and BC represents consumption per worker.
D) consumption per worker, and BC represents investment per worker.

47. The rate of labor-augmenting technological progress (g) is the growth rate of:
A) labor.
B) the efficiency of labor.
C) capital.
D) output.

48. If the labor force is growing at a 3 percent rate and the efficiency of a unit of labor is growing at a 2 percent rate, then the number of effective workers is growing at a rate of:
    A) 2 percent.
    B) 3 percent.
    C) 5 percent.
    D) 6 percent.

49. Assume that a country's production function is $Y = K^{1/2}L^{1/2}$.
    a. What is the per-worker production function $y = f(k)$?
    b. Assume that the country possesses 40,000 units of capital and 10,000 units of labor. What is Y? What is labor productivity computed from the per-worker production function? Is this value the same as labor productivity computed from the original production function?
    c. Assume that 10 percent of capital depreciates each year. What gross saving rate is necessary to make the given capital-labor ratio the steady-state capital-labor ratio? (*Hint:* In a steady state with no population growth or technological change, the saving rate multiplied by per-worker output must equal the depreciation rate multiplied by the capital-labor ratio.)
    d. If the saving rate equals the steady-state level, what is consumption per worker?

50. Which of the following changes would bring the U.S. capital stock, currently below the Golden Rule level, closer to the steady-state, consumption-maximizing level?
    A) increasing the population growth rate
    B) increasing the rate of capital depreciation
    C) increasing the rate of technological progress
    D) increasing the saving rate