# Practice Questions for Part III and Part IV, Chapters 7-11

## Section 1. Multiple Choice Questions

(Note: All of the following questions appeared on the second mid-term exam in previous years.)

Ch. 7 1. Suppose that in a certain economy both *K* and *L* grow at 1% annually. If *Y* grows by 3% per year, we can conclude that the annual rate of increase of total factor productivity [*A*], or the annual rate of technological progress, is
A) 0.33%
B) 1%
C) 2%
D) 4%

Ch 7 2. In the Solow growth model output per worker (*y*) depends **only** on capital per worker (*k*) because of the assumption that
A) employment of labour is constant
B) there are constant returns to scale
C) there is diminishing marginal productivity of capital
D) labour is not a factor of production

Ch. 7 3. In the Solow growth model actual investment per worker (*i*)
A) is a fixed proportion of output per worker (*y*)
B) is a fixed proportion of capital per worker (*k*)
C) is equal to saving per worker but only in the steady-state
D) is constant

Ch. 7 4. When an economy **without** population growth and **without** technological progress is in the steady-state:
A) *k,y, K*, and *Y* are all constant
B) *k* and y are constant but *K* and *Y* are both growing at the same positive rate
C) *k* and *y* are both growing at the same constant rate
D) *k* and *y* are both growing but at different rates depending on the savings rate(*s*)

Ch. 7 5. In the Solow model, if $k < k^*$ which of the following is true?
A) actual investment is less than the amount required to keep *k* constant
B) actual investment is more than the amount required to keep *k* constant
C) *k* will decrease
D) the rate of saving (*s*) will increase in order to increase *k* to $k^*$

Ch. 7 6. Consider an economy without technological progress in which: people save 10% of their income; 5% of the capital stock wears out each year; the labour force grows at 2% per year; and each worker currently has $50,000 of capital to work with and currently produces $40,000 of output per year. Then capital per worker ($k$) is currently
A) increasing by $ 500 per year
B) decreasing by $ 500 per year
C) increasing by $1200 per year
D) decreasing by $1200 per year

Ch. 7 7. In the Solow model with population growth a **decrease** in the rate of population growth [$\downarrow n$] will
A) lower $y^*$ and lower the steady-state rate of growth of $Y$
B) raise $y^*$ and lower the steady-state rate of growth of $Y$
C) raise $y^*$ and raise the steady-state rate of growth of $Y$
D) lower $y^*$ and raise the steady-state rate of growth of $Y$

Ch. 7 8. The Solow growth model with population growth but **without technological progress** cannot explain persistent growth in the standard of living as measured by growth in per capita income because in such a model in the steady-state
A) total output grows but only as fast as population
B) total output does not grow in the steady state
C) total output grows but not as fast as population grows because of diminishing returns
D) capital depreciates faster than it is being replaced by new investment

Ch. 8 9. In the steady state in the Solow model with labour-augmenting technological progress occurring at rate $g$ and population growth occurring at rate $n$:
A) total output ($Y$) is growing at rate $g$
B) output per actual worker ($Y/L$) is growing at rate $g$
C) output per effective worker ($y$) is growing at rate $g$
D) total output ($Y$) is growing at rate $n$

Ch. 8 10. There is a role for government in encouraging research and development activity because private profit making firms may under invest in R&D because
A) there are sizeable positive externalities associated with such investment
B) there are sizeable negative externalities associated with such investment
C) there are very small positive externalities associated with such investment
D) the private return to such activities exceeds the social return

Ch. 10 11. In the **Keynesian-cross** model of short-run output determination, as developed in Ch.10, the aggregate expenditure curve, which relates E to Y, **slopes upward** because
A) investment spending (I) rises as the interest rate ( r) falls
B) consumption spending (C) rises as aggregate income (Y) rises
C) government spending (G) rises as tax revenue (T) rises with growth in Y
D) all of the above

Ch. 10 12. In the Keynesian cross model, if the government wished to use an increase in government spending [ $\overline{G}$ ] to exactly offset a $10 billion reduction in investment spending [ $\bar{I}$ ] thus stabilizing the levels of *E* and *Y,* it should
A) increase $\overline{G}$ by $10 billion
B) increase $\overline{G}$ by $10 billion divided by the multiplier
C) increase $\overline{G}$ by $10 billion multiplied by the MPC
D) increase $\overline{G}$ by $10 billion multiplied by (1-MPC)

Ch. 10 13. In the Keynesian cross model if the level of taxes is **cut by $2 billion** [ $\Delta T$ = -$2 billion] then the planned expenditure curve will
A) shift up by $2 billion
B) shift up by $2 billion multiplied by the MPC
C) shift up by $2 billion multiplied by 1/(1-MPC)
D) shift down

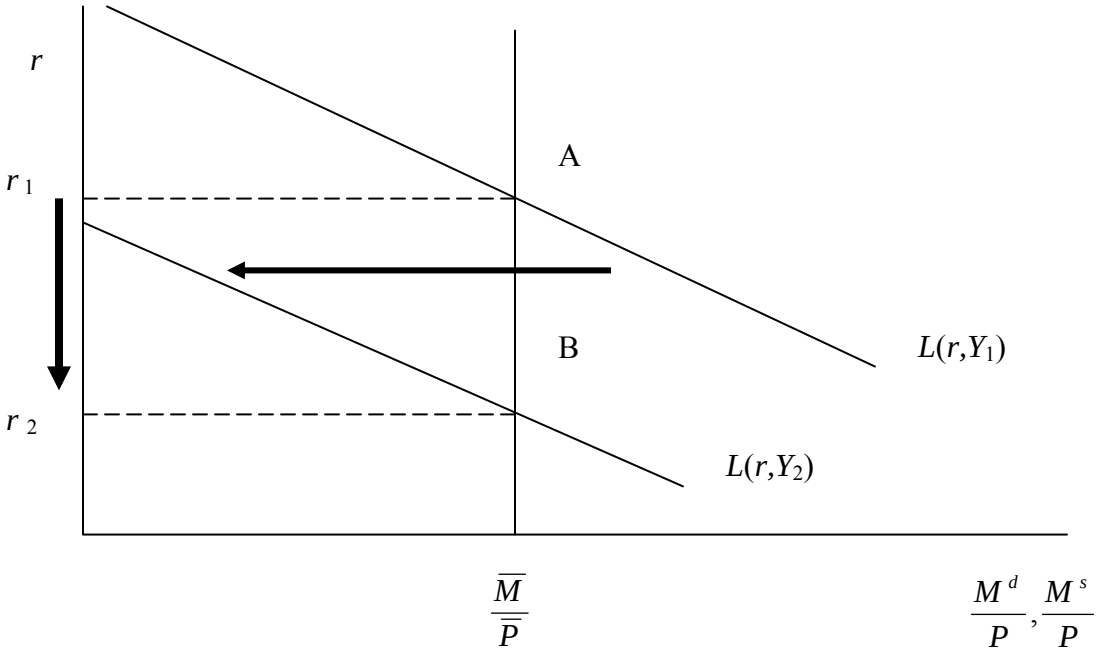
Ch. 10 14. The multiplier of income with respect to an increase in government spending is smaller in practice than our Keynesian cross model suggests because in the real world, in contrast to our model:
A) part of any increase in consumer spending is spent on imports
B) the marginal propensity to consume is less than one
C) part of any increase in output is exported
D) all of the above

Ch. 10 15. The **IS** curve of the economy can be graphically derived using a Keynesian cross diagram
A) by varying either *G* or *T*, while holding *r* constant,
B) by varying *r,* while holding both *G* and *T* constant
C) by varying *Y*, while holding both *r* and *M/P* constant
D) by varying any one of *r, G*, or *T* while holding *M/P* constant

Ch. 10.16. At all points along an **IS** curve
A) money demand equals money supplied [ $L(r,Y) = \overline{M} / \overline{P}$ ]
B) output equals planned expenditure [ $Y = E$ ]
C) Both A) and B)
D) none of the above

Ch. 10 17. An **LM** curve is derived graphically by
A) shifting the money demand curve in response to changes in *Y* with *M/P* constant
B) shifting the money supply curve in response to changes in monetary policy with *Y* held constant
C) shifting the aggregate expenditure curve in response to changes in interest rate with other determinants of demand for goods held constant
D) shifting the money demand curve in response to changes in interest rate with *M/P* constant

Ch. 10 18.




The changes shown in the diagram above imply
A) a shift to the **right** of the LM curve
B) a movement **upwards** [away from the origin] along a **given** LM curve
C) a movement **downwards** [to the origin] along a **given** LM curve
D) a shift to the **left** of the LM curve

Ch. 11. 19. In the short-run IS-LM model a **cut in taxes** ($\downarrow \bar{T}$), with no change in any other exogenous variable,
A) causes higher equilibrium levels of consumption and investment
B) causes consumer spending to rise but government spending to fall
C) causes a higher equilibrium consumption with no change in the equilibrium levels of investment or government spending
D) causes a higher equilibrium level of consumption but a lower equilibrium level of investment spending

Ch. 11 20. In the short run IS-LM model a given **increase in money supply** ($\uparrow \overline{M}$), with no change in any other exogenous variable, will produce a larger increase in equilibrium income
A) the more responsive is investment spending to the interest rate and hence the flatter the IS curve
B)the more responsive is investment spending to the interest rate and hence the steeper the IS curve
C) the more responsive is investment spending to the interest rate and hence the flatter the LM curve
D) the less responsive is investment spending to the interest rate and hence the flatter the IS curve

Ch. 11 21. In comparison to the effects of a $1 billion increase in government spending ($\overline{G}$) a $1 billion cut in taxes ($\overline{T}$) will result in
A) an equal change in both equilibrium output and equilibrium interest rate
B) smaller changes in both equilibrium income and equilibrium interest rate
C) larger changes in both equilibrium income and equilibrium interest rate
D) a smaller change in equilibrium income but a larger change in equilibrium interest rate

Ch. 11 22. Suppose that in the IS-LM model a sudden **decline in consumer confidence** leads to an immediate drop in consumer spending (C) at a given level of income (Y). Which of the following policy combinations would best offset the negative effects on planned expenditure and output of this demand shock?
A) a tax cut combined with a monetary policy which increases interest rates
B) a tax increase combined with a monetary policy which keeps interest rates constant
C) a tax cut combined with a monetary policy which allows interest rates to fall
D) a tax cut combined with a monetary policy which keeps interest rates constant

Ch. 11 23. Consider a government faced with a need to **reduce a large budget deficit** while **avoiding a recession**. Which of the following would be the best mix of fiscal and monetary policies to pursue?
A) tight fiscal policy (e.g. cuts in *G*) combined with a monetary policy designed to keep **money supply constant**
B) tight fiscal policy (e.g. cuts in *G*) combined with a monetary policy designed to keep **interest rates constant**
C) tight fiscal policy (e.g. cuts in *G*) combined with **increases in money supply**
D) tight monetary policy (e.g. cuts in *M*) combined with a fiscal policy designed to keep output constant

Ch. 11 24. In the IS-LM model an increase in money supply ($\uparrow \overline{M}$), with no change in any other exogenous variable, will in the **LONG RUN** lead to which of the following?

A) an increase in price level and decrease in interest rate with no change in output
B) an increase in price level with no change in interest rate and no change in output
C) a decrease in interest rate with no change in price level and no change in output
D) no change in any of the price level, interest rate or output

Ch. 11 25. Suppose that an economy is initially in long-run equilibrium with $Y = \overline{Y} = 1000$ and r = 0.05 (5%). There is then a permanent **increase** in government spending ($\uparrow \overline{G}$). Which of the following is a correct prediction of **the effects on the LONG-RUN equilibrium** values of output and interest rate of this increase in government spending?

A) Y = 1000 and r = 0.05 (5%)
B) Y > 1000 and r > 0.05 (5%)
C) Y = 1000 and r < 0.05 (5%)
D) Y = 1000 and r > 0.05 (5%)

## Section 2: Problems

### Chapter 7

**7.1**

a) In a certain economy the labour force ($L$) and the capital stock ($K$) are growing each year at the **same** annual rate. Aggregate output ($Y$) is growing at a constant rate of 3% per year while output per capita (or output per worker, $Y/L$) is growing at a constant annual rate of 1%. Use the growth accounting equation which we developed (Appendix to Ch 8) to answer the following questions: i) how fast is the labour force ($L$) [and capital stock ($K$)] growing in this economy? and ii) what must be happening to total factor productivity in this economy?

b) Now suppose that the rate of growth of the **capital** stock **doubles** while the rate of growth of the **labour force** is **halved** . Assuming that there is no change in the rate of technological progress and assuming the elasticity of output with respect to an increase in capital is **one-third**, use the growth accounting equation to calculate the new rates of growth of aggregate output and per capita output.

**7.2**

Consider an economy in which aggregate output ($Y$) is a function of inputs of capital ($K$) and labour, measured in numbers of workers employed, ($L$), as follows:

$$Y = 100K^{1/2}L^{1/2} \quad \text{or, equivalently,} \quad Y = 100\sqrt{K}\sqrt{L}$$

Output per worker ($y$) is a function of the amount of capital per worker ($k$) as follows:

$$y = 100k^{1/2} \quad \text{or, equivalently,} \quad y = 100\sqrt{k} \quad \text{(where } y \text{ and } k \text{ are in \$)}$$

In this economy, people save 20% of their incomes ($s$ =0.20) while 5% of the capital stock wears out (depreciates) each year ($\delta$ =0.05). There is no population growth or technological change ($n$ =$g$ = 0).

a)

| **Year** | **Capital per worker ($k$)** | **Output per worker ($y$)** |
|---|---|---|
| 1 | \$90,000 | \$30,000 |
| 2 | | |

Given the information provided, fill in the shaded areas in the above table.

b) Calculate the ***steady-state*** values of capital per worker and output per worker ($k$* and $y$*) for this economy.

c) Find the ***golden-rule*** steady-state values of capital per worker and output per worker for this economy ($k^*_{gold}$ and $y^*_{gold}$). [ Hint: the marginal product of capital ($MPK$) is the first derivative of the function $y = 100k^{1/2}$.]

d) Now suppose that population, labour force, and the number of workers employed start to grow at a constant rate of 1.25% per year ($n$ = 0.0125). All other specifications of this economy are unchanged. Calculate the ***steady-state*** values of capital per worker and output per worker ($k$* and $y$*). Explain why these values are different from the values you calculated in answer to part a) using a diagram to illustrate and writing out a brief explanation of the process of change in $k$* and $y$*.

e) Find the ***golden-rule*** steady-state values of capital per worker and output per worker for this economy ($k^*_{gold}$ and $y^*_{gold}$). [Hint: See textbook page 230.] Using the diagram you have drawn in answer to part d), explain why the golden-rule steady-state value of $k$ is lower in this case than in the case considered in part c).

**Chapter 8.**

**8.1**

In the United States the average rate of growth of aggregate output ($Y$) is about 3% per year; the depreciation rate is 4% per year; and the capital output ratio is about 2.5 (i.e.

*K/Y* = *k/y* = 2.5). Assuming that the US economy can be described by a Solow growth model with (labour-augmenting) technological change and assuming also that the US economy is in steady-state growth equilibrium what is the implied saving rate (s) in the United States? [Hint: use the condition for steady-state equilibrium with population growth and technological change, $sy = (\delta + n + g)k$ , and your understanding of the determinants of steady-state output growth in such an economy.]

**Chapter 10**

**10.1**

Consider a Keynesian-cross model of an economy in which:

$E = C + I + G$

$C = 140 + 0.60(Y - T)$

$I = \bar{I} = 170$

$G = \overline{G} = 210$

$T = \overline{T} = 200$

a) Find the equilibrium levels of income and consumption spending (all variables are measured in $ billions).

b) Draw a Keynesian-cross diagram to shows how planned consumption expenditure (*C*) and planned total expenditure (*E*) vary with *Y*, identifying the values of the vertical intercepts and slopes of the functions you have drawn. On the diagram locate the values which you calculated in answer to part a).

c) Suppose that an increase in consumer confidence occurs which changes the form of the consumption function of this economy to: $C = 180 + 0.60(Y - T)$ . Assuming no other changes to the specification of the model, use the diagram which you drew in answer to part b) to show the impact of this increase in consumer confidence on the equilibrium values of *Y* and *C*. (Make sure that you can explain the process of adjustment of spending and output to their new equilibrium levels.)

**10.2**

Consider two economies A and B in which investment spending are (different) decreasing functions of the rate of interest as follows:

$I_A = 100 - 500r$ and $I_B = 60 - 400r$

(*I* is measured in $ billion and *r* is a decimal fraction.)

Assuming that all other relevant aspects of two economies (A and B) are **identical (**i.e. identical consumption functions, identical levels of taxes and govt. spending) how might you expect the IS curves of the two economies ( $IS_A, IS_B$ ) to **differ** from one another? Explain.

**10.3**

In a certain economy the demand for money is a linear function of real GDP (*Y*) and the rate of interest (*r*) as follows:

$$(M/P)^d = L(r,Y) = 0.5Y - 1000r$$

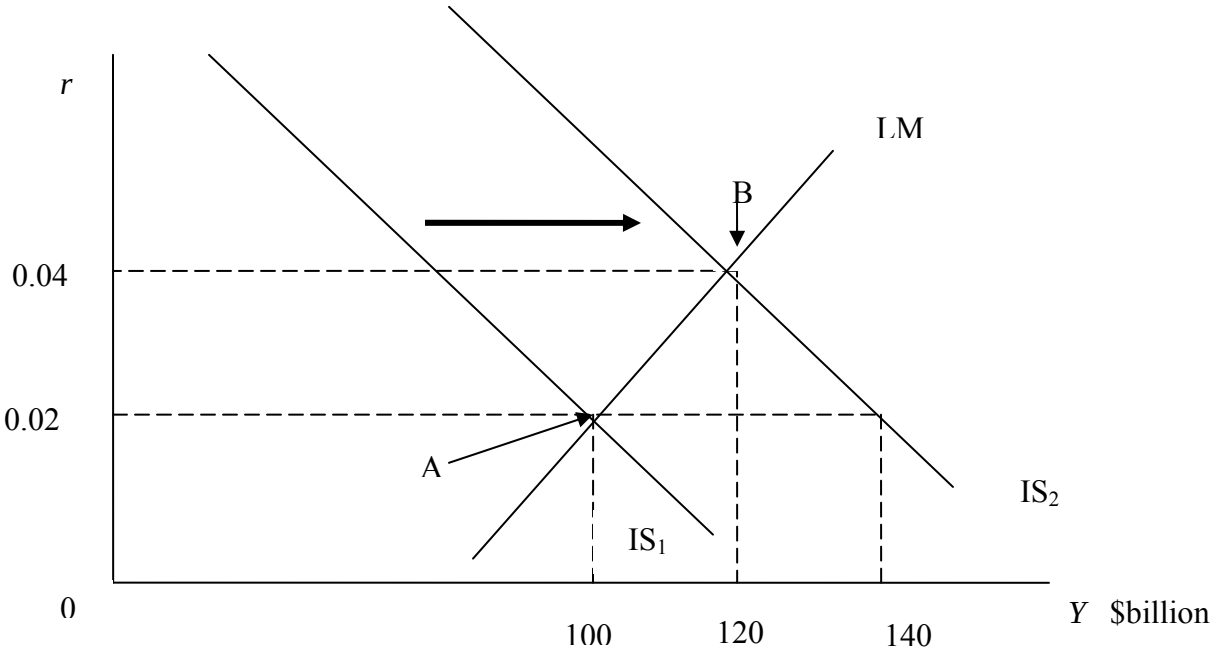
| **COMBINATION** | **Real money supply** $(\overline{M} / \overline{P})$ | **Real GDP (*Y*)** | **Rate of interest (*r* )** |
|---|---|---|---|
| A | 460 | 1000 | 0.03 |
| B | 460 | 1000 | 0.04 |
| C | 460 | 1020 | 0.05 |
| D | 480 | 1020 | 0.05 |
| E | 480 | 1030 | 0.035 |

a) The table shows 5 combinations (A,B,C,D E) of values for *Y*, *r* and *M/P*. Which of the above combinations of variable values define point(s) which: i) is/are **on <u>an</u>** LM curve; ii) is/are **<u>not</u> on an** LM curve; iii) are on the **<u>same</u>** LM curve. Explain.

b) Draw a two-panel (money market and LM curve) diagram, similar to Figure 10-12 in the textbook and in your Lecture Notes, to show the curves consistent with **combination B** in the above table.

**Chapter 11.**

**11.1**




a) The IS-LM diagram above shows the **short-run** effects of a **$10 billion increase in government expenditure (** $\Delta\overline{G} = 10$) with no change in any other exogenous variable. Using the figures shown in the diagram calculate the changes in equilibrium consumption spending ($\Delta C$) and equilibrium investment spending ($\Delta I$) between the initial IS-LM equilibrium (point A) and the new short-run IS-LM equilibrium (point B). [Make sure that you can explain the process of adjustment in output (Y) and interest rate (r) as the economy moves from point A to point B.]

b) Suppose that $\overline{Y} = 100$ . What will be the **long-run equilibrium** values of *Y* and *r* resulting from this $10 billion increase in government spending? Explain, using the above diagram. Identify the new long-run equilibrium as point C. How has the composition of output (between C, I and G) changed between points A and C? Explain. [Make sure that you can explain the process of adjustment in output (Y) and interest rate (r) as the economy moves from point B to point C.]

c) Suppose the money demand function for this economy is:

$$(M/P)^d = Y - 1000r$$

If the nominal money supply of this economy is $80 billion ( $\overline{M} = 80$ ) calculate the values of the price level of the economy (P) consistent with short-run IS-LM equilibrium at points A and B and with long run equilibrium at point C.