

Past-paper walk-through

Multipliers ■ 3.2

eXercise

Questions in this set

- 2026 Q3
- 2025 Set 1 Q3
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Questions in this set

- 2015 Q1
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Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 3

2026 ■ Q3

Lizland is a small island nation, and its currency is the Lizland crown (LIZ). The economy of Lizland is in short-run macroeconomic equilibrium with a 600 million crown recessionary gap.

(a)(i) Policymakers in Lizland are considering taking action to close the recessionary gap in the short run.

The central bank of Lizland is considering implementing monetary policy. The banking system of Lizland has ample reserves. Identify a specific monetary policy action the central bank of Lizland would implement to close the recessionary gap in the short run.

(a)(ii) The government of Lizland is also considering changing its spending, and the marginal propensity to consume is 0.75. Calculate the minimum change in government spending and identify the direction of the change required to fully close the 600 million crown recessionary gap in the short run. Show your work.

Question 3

2026 ■ Q3

Lizland is a small island nation, and its currency is the Lizland crown (LIZ). The economy of Lizland is in short-run macroeconomic equilibrium with a 600 million crown recessionary gap.

(b) Assume that the government of Lizland decides to change its spending as calculated in part A (ii). Based solely on this change, will the price level in Lizland increase, decrease, or remain the same in the short run? Explain.

Question 3

2026 ■ Q3

Lizland is a small island nation, and its currency is the Lizland crown (LIZ). The economy of Lizland is in short-run macroeconomic equilibrium with a 600 million crown recessionary gap.

(c) The nations of Lizland and Andoh are trading partners with flexible exchange rates. The currency of Andoh is the Andoh note (AND). Draw a correctly labeled graph of the foreign exchange market for the Lizland crown (LIZ). Based solely on the change in the price level in part B, show the change in the international value of the Lizland crown on your graph.

Question 3

2025 Set 1 ■ Q3

3. The table provided shows the quantities and unit prices of shirts, bread, and pants, the only three goods produced in the country of Middleland in 2021 and 2022. Assume that 2021 was the base year.

	Shirts	Bread	Pants
Unit Prices in 2021	\$11	\$4	\$12
Unit Prices in 2022	\$10	\$5	\$15
Quantities Produced in 2021 and 2022	50	70	30

Question 3

- A. Was the real GDP in 2021 in Middleland greater than, less than, or equal to the nominal GDP in 2021? Explain.
- B. Calculate the real GDP in Middleland in 2022. Show your work.
- C. Assume that Middleland was in short-run equilibrium in 2022 and that POTENTIAL real GDP was \$1,150 in 2022. Draw a correctly labeled graph of the aggregate demand, short-run aggregate supply, and long-run aggregate supply curves for Middleland in 2022, and show each of the following.
 - i. The equilibrium real output and price level, labeled Y_1 and PL_1 , respectively
 - ii. The full-employment output, labeled Y_F
- D. Assume the marginal propensity to consume in Middleland is 0.8. Calculate the minimum change and state the direction of change in government spending required to close the output gap in the short run in Middleland. Show your work.

STOP
END OF EXAM

Solution 3

(a)

Mark scheme

- Real GDP in 2021 was EQUAL to nominal GDP in 2021. Because 2021 is the base year, the price level has not changed relative to itself, and real values always equal nominal values in the base year. 1 point.

Solution 3

(b)

Mark scheme

- Real GDP in Middleland in 2022 =
 $1,190$ (2021 base – year prices applied to 2022 quantities). Work: $Real GDP = (11 \times 50) + (4 \times 70) + (12 \times 30) = 550 + 280 + 360 = 1,190$. 1 point for the calculation with work shown.

Solution 3

(c)

Mark scheme

- This line is only the stem instructing the student to draw the AD/SRAS/LRAS graph for 2022 and 'show each of the following'; it has no independently scorable content beyond what is graded in C(i) and C(ii).

Solution 3

(c)(i)

Mark scheme

- Draw a correctly labeled aggregate demand–aggregate supply graph (Price Level on the vertical axis, Real GDP on the horizontal axis) with a downward-sloping AD curve and an upward-sloping SRAS curve intersecting at the equilibrium point, labeling the equilibrium price level PL_1 and equilibrium real output Y_1 . 1 point.

Solution 3

(c)(ii)

Mark scheme

- On the same graph, add a vertical long-run aggregate supply (LRAS) curve positioned to the LEFT of Y_1 (since 2022 short-run output $Y_1 = 1,190$ exceeds potential real GDP of 1,150), and label the full-employment output on the LRAS curve as Y_F . 1 point.

Solution 3

(d)

Mark scheme

- Minimum change in government spending = a DECREASE of \$8. Work:
Output Gap = Potential GDP – Actual 2022 Real GDP = \$1,150 – \$1,190
= –\$40. Spending multiplier = $1/(1-MPC) = 1/(1-0.8) = 5$. Minimum
 $\Delta G = \text{Output Gap} \div \text{Multiplier} = -\$40 \div 5 = -\$8$ (government spending
must decrease by \$8 to close the inflationary output gap). 1 point for the
calculation with work shown.

Question 3

2025 Set 2 ■ Q3

Assume that Nepal is in long-run macroeconomic equilibrium and has an open economy.

- (a)(i)** Draw a correctly labeled graph of the aggregate demand, short-run aggregate supply, and long-run aggregate supply curves for Nepal, and show each of the following. The current equilibrium real output and price level, labeled Y_1 and PL_1 , respectively
- (a)(ii)** The full-employment output, labeled Y_F

Question 3

2025 Set 2 ■ Q3

Assume that Nepal is in long-run macroeconomic equilibrium and has an open economy.

(b) Nepal and Thailand are trading partners. Assume that Thailand experiences an increase in real income. On your graph in part A, show the short-run effect of the increase in real income in Thailand on real output and the price level in Nepal, labeling the new short-run equilibrium real output Y_2 and the new short-run equilibrium price level PL_2 .

Question 3

2025 Set 2 ■ Q3

Assume that Nepal is in long-run macroeconomic equilibrium and has an open economy.

(c) Assume that at the short-run equilibrium shown on your graph in part B, Nepal is experiencing a 400 million rupee output gap. Policymakers in Nepal want to use discretionary fiscal policy to return the economy to full employment, and the marginal propensity to consume is 0.75. Calculate the minimum change and state the direction of change in government spending required to completely close the output gap in the short run. Show your work.

Question 3

2025 Set 2 ■ Q3

Assume that Nepal is in long-run macroeconomic equilibrium and has an open economy.

(d) Assume instead that no discretionary policy actions are taken. Explain how automatic stabilizers in the short run would reduce the effect of the change in real output shown on your graph in part B.

Solution 3

(a)(i)

Mark scheme

- Draw a graph with Price Level on the vertical axis and Real GDP on the horizontal axis: a downward-sloping aggregate demand curve AD1 and an upward-sloping short-run aggregate supply curve SRAS1, intersecting at equilibrium price level PL1 and equilibrium real output Y1.

Solution 3

(a)(ii)

Mark scheme

- On the same graph, add a vertical long-run aggregate supply curve (LRAS) at the full-employment output, labeled Y_F , positioned at the same real output as Y_1 (i.e., $Y_1 = Y_F$), showing the economy currently at long-run equilibrium.

Solution 3

(b)

Mark scheme

- On the same graph, shift the aggregate demand curve rightward from AD1 to AD2: the increase in real income in Thailand (a trading partner) increases demand for Nepal's exports, increasing Nepal's net exports and aggregate demand. This raises the new short-run equilibrium real output to Y2 (labeled to the right of $Y1 = Y_F$) and raises the new short-run equilibrium price level to PL2 (labeled above PL1), at the intersection of AD2 and SRAS1.

Solution 3

(c)

Mark scheme

- Spending multiplier = $1 / (1 - \text{MPC}) = 1 / (1 - 0.75) = 4$. Minimum change in government spending = $-(\text{output gap}) / \text{multiplier} = -400 \text{ million rupees} / 4 = -100 \text{ million rupees}$. Because the economy is at $Y_2 > Y_F$ (an inflationary/positive output gap of 400 million rupees, per part B), government spending must **DECREASE** by a minimum of 100 million rupees to close the gap and return output to Y_F .

Solution 3

(d)

Mark scheme

- Without discretionary policy action, automatic stabilizers reduce the effect of the increase in real output shown in part B: as real income (output) rises, tax revenues automatically increase and/or transfer payments automatically decrease. This slows the rate at which disposable income rises, which slows the growth of consumption spending, dampening the rightward shift of aggregate demand and the resulting increase in real GDP and the price level.

Question 1

2024 Set 2 ■ Q1

Assume that the economy of Moneyland is in equilibrium with an actual unemployment rate equal to the natural rate of unemployment.

(a) Draw a correctly labeled graph of the aggregate demand, short-run aggregate supply, and long-run aggregate supply curves, and show each of the following.

(a)(i) The current equilibrium real output and price level, labeled Y_1 and PL_1 , respectively

(a)(ii) The full employment output, labeled Y_F

Question 1

2024 Set 2 ■ Q1

Assume that the economy of Moneyland is in equilibrium with an actual unemployment rate equal to the natural rate of unemployment.

(b) Assume that consumer spending in Moneyland decreases from \$110,000 to \$100,000 as a result of a decrease in disposable income in Moneyland from \$135,000 to \$110,000.

(b)(i) Calculate the marginal propensity to consume in Moneyland. Show your work.

(b)(ii) Show the short-run effect of the decrease in consumer spending in Moneyland on your graph in part (a), labeling the new equilibrium real output and price level Y_2 and PL_2 , respectively.

Question 1

2024 Set 2 ■ Q1

Assume that the economy of Moneyland is in equilibrium with an actual unemployment rate equal to the natural rate of unemployment.

(c) Following the decrease in consumer spending, explain how the economy would adjust in the long run in the absence of any policy actions.

Question 1

2024 Set 2 ■ Q1

Assume that the economy of Moneyland is in equilibrium with an actual unemployment rate equal to the natural rate of unemployment.

(d) The central bank of Moneyland is concerned about the short-run effects of the decrease in consumer spending on the broader economy and is considering taking action rather than waiting for the long-run adjustment process. Assuming the banking system in Moneyland has ample reserves, identify a specific monetary policy action the central bank of Moneyland would take to increase consumer spending.

Question 1

2024 Set 2 ■ Q1

Assume that the economy of Moneyland is in equilibrium with an actual unemployment rate equal to the natural rate of unemployment.

(e) Draw a correctly labeled graph of the reserve market in Moneyland, and show the effect of the monetary policy action identified in part (d) on the policy rate.

Question 1

2024 Set 2 ■ Q1

Assume that the economy of Moneyland is in equilibrium with an actual unemployment rate equal to the natural rate of unemployment.

(f) How would the change in the policy rate shown on your graph in part (e) affect each of the following in Moneyland in the short run?

(f)(i) The quantity of national savings

(f)(ii) Unemployment. Explain.

Solution 1

(a)

Mark scheme

- Setup instruction only (no independent points) — draw one AD–SRAS–LRAS diagram with Price Level on the vertical axis and Real GDP on the horizontal axis, showing a downward-sloping AD_1 curve and an upward-sloping $SRAS_1$ curve. The two scored elements are given in (a)(i) and (a)(ii).

Solution 1

(a)(i)

Mark scheme

- Label the intersection of AD_1 and $SRAS_1$: drop dashed lines to the axes to show equilibrium price level PL_1 (vertical axis) and equilibrium real output Y_1 (horizontal axis) at that intersection.

(a)(ii)

Mark scheme

- Add a vertical long-run aggregate supply curve (LRAS) positioned exactly at the $AD_1/SRAS_1$ intersection — i.e., at Y_1 — and label it Y_F , showing $Y_1 = Y_F$ (the economy begins at full-employment/potential output).

Solution 1

(b)

Mark scheme

- Stem/data only — consumer spending in Moneyland falls from \$110,000 to \$100,000 as disposable income falls from \$135,000 to \$110,000. Scored in (b)(i) and (b)(ii) below.

Solution 1

(b)(i)

Mark scheme

$$\blacksquare \text{ MPC} = \frac{\Delta \text{Consumer Spending}}{\Delta \text{Disposable Income}} = \frac{\$100,000 - \$110,000}{\$110,000 - \$135,000} = \frac{-\$10,000}{-\$25,000} = 0.4.$$

Award the point for showing this calculation and arriving at $\text{MPC} = 0.4$.

Solution 1

(b)(ii)

Mark scheme

- On the graph from part (a), shift the AD curve leftward from AD_1 to AD_2 (a fall in consumer spending is a fall in aggregate demand). The new AD_2 curve intersects $SRAS_1$ at a lower price level, labeled PL_2 (with $PL_2 < PL_1$), and lower real output, labeled Y_2 (with $Y_2 < Y_1 = Y_F$).

Solution 1

(c)

Mark scheme

- Because Y_2 is below full-employment output Y_F , the economy has a recessionary (negative) output gap with higher-than-natural unemployment. This puts downward pressure on input prices (e.g., nominal wages) and/or lowers inflationary expectations, so short-run aggregate supply increases (SRAS shifts rightward) over time. SRAS keeps shifting right until it re-intersects AD_2 at Y_F , restoring full-employment equilibrium at a lower price level — the economy self-corrects without policy action.

Solution 1

(d)

Mark scheme

- The central bank should use expansionary monetary policy. Since the banking system has ample reserves, an open-market purchase would not move the policy rate; instead the central bank should decrease an administered rate — e.g., decrease the interest rate paid on reserve balances (interest on reserves), or decrease the discount rate — to pull the policy/floor rate down and lower the cost of borrowing, increasing consumer spending.

Solution 1

(e) Mark scheme

- Draw a reserve-market graph with Policy Rate on the vertical axis and Quantity of Reserves on the horizontal axis: a vertical reserve supply curve S_R in the ample-reserves range intersects the kinked demand curve D_R (downward-sloping then flat) on its flat segment, at quantity Q_1 and initial policy rate PR_1 (1 point). For the second point, show the effect of the monetary action from part (d): shift the flat (administered-rate) segment of D_R downward, so the new intersection with S_R occurs at the same quantity Q_1 but a lower policy rate $PR_2 < PR_1$ (a decrease in the lower bound of the demand curve for reserves, or equivalently a downward shift of the administered rate, lowers the policy rate).

Solution 1

(f)

Mark scheme

- Stem only — asks for the short-run effect of the lower policy rate from part (e) on (i) the quantity of national savings and (ii) unemployment. Scored in (f)(i) and (f)(ii) below.

Solution 1

(f)(i)

Mark scheme

- The quantity of national savings would decrease. A lower policy/interest rate reduces the return to saving, so households and firms choose to save less (equivalently, in the loanable funds market a lower interest rate corresponds to a lower quantity of national savings supplied).

Solution 1

(f)(ii)

Mark scheme

- Unemployment would decrease. Explanation: the decrease in the policy rate lowers nominal (and real) interest rates, which increases interest-sensitive spending — consumption (e.g., durable goods bought on credit), investment (business borrowing for capital), and/or net exports (via currency depreciation). This raises aggregate demand and real output, moving the economy back toward/beyond full employment and lowering the unemployment rate.

Question 1

2023 Set 1 ■ Q1

Assume the economy of Vanderlandia is in short-run equilibrium with a real GDP of 500 million. The full – employment level of real GDP is 550 million.

- (a)** Draw a correctly labeled graph of the aggregate demand, short-run aggregate supply, and long-run aggregate supply curves, and show each of the following.
- (i) The current equilibrium real output and price level, labeled Y_1 and PL_1 , respectively
 - (ii) The full-employment output, labeled Y_F

Question 1

2023 Set 1 ■ Q1

Assume the economy of Vanderlandia is in short-run equilibrium with a real GDP of 500 million. The full – employment level of real GDP is 550 million.

(b)(i) Assume no policy action is taken to restore full employment.

Explain how the economy will adjust in the long run.

(b)(ii) Following the long-run adjustment process, will the price level in Vanderlandia be greater than, less than, or equal to PL_1 shown on your graph in part (a)?

Question 1

2023 Set 1 ■ Q1

Assume the economy of Vanderlandia is in short-run equilibrium with a real GDP of 500 million. The full – employment level of real GDP is 550 million.

(c)(i) Assume instead that policymakers in Vanderlandia are considering changing government spending to restore full employment in the short run and that the marginal propensity to save is 0.2.

Calculate the minimum change and state the direction of change in government spending required to completely close the output gap in the short run. Show your work.

(c)(ii) On your graph in part (a), show the short-run effect of the change in government spending in part (c)(i), labeling the new equilibrium price level PL_2 .

Question 1

2023 Set 1 ■ Q1

Assume the economy of Vanderlandia is in short-run equilibrium with a real GDP of 500 million. The full – employment level of real GDP is 550 million.

(d) Draw a correctly labeled graph of the loanable funds market, and show the effect of the change in government spending in part (c)(i) on the equilibrium real interest rate.

Question 1

2023 Set 1 ■ Q1

Assume the economy of Vanderlandia is in short-run equilibrium with a real GDP of 500 million. The full – employment level of real GDP is 550 million.

(e)(i) Based on the change in the real interest rate shown on your graph in part (d), what will happen to each of the following?

The price of previously issued bonds

(e)(ii) The rate of economic growth in the long run. Explain.

Solution 1

(a)

Mark scheme

- Draw a standard downward-sloping AD curve and upward-sloping SRAS curve (Price Level on the vertical axis, Real GDP on the horizontal axis). Label their intersection as the current equilibrium, with equilibrium output Y_1 on the horizontal axis and equilibrium price level PL_1 on the vertical axis (dashed lines from the intersection to each axis) — this earns Point 1. Then add a vertical long-run aggregate supply curve (LRAS) positioned to the RIGHT of Y_1 , and label the real GDP value at which it sits Y_F (full-employment output) — this earns Point 2.

Solution 1

(b)(i)

Mark scheme

- Since Y_1 is below full-employment output Y_F (a recessionary gap), in the long run nominal wages and other input prices (and/or inflationary expectations) will decrease. This fall in input costs causes short-run aggregate supply (SRAS) to increase (shift rightward) until the economy self-corrects back to equilibrium at full employment, Y_F .

Solution 1

(b)(ii)

Mark scheme

- The price level following the long-run adjustment will be LESS THAN PL_1 — as SRAS shifts rightward, the new equilibrium slides down along AD, so both output rises to Y_F and the price level falls below its original level PL_1 .

Solution 1

(c)(i)

Mark scheme

- Spending multiplier $= 1/\text{MPS} = 1/0.2 = 5$. Minimum change in government spending $= \frac{\text{Output Gap}}{\text{Spending Multiplier}} = \frac{\$50 \text{ million}}{5} = \10 million . Government spending must INCREASE by \$10 million to fully close the recessionary output gap in the short run.

Solution 1

(c)(ii)

Mark scheme

- On the graph from part (a), shift the AD curve rightward (from AD_1 to AD_2) so the new short-run equilibrium occurs exactly where AD_2 intersects $SRAS_1$ at the vertical LRAS curve (i.e., at Y_F), with the new, higher equilibrium price level labeled PL_2 (where $PL_2 > PL_1$).

Solution 1

(d) Mark scheme

- Draw a standard loanable funds market graph (Real Interest Rate on the vertical axis, Quantity of Loanable Funds on the horizontal axis) with a downward-sloping demand curve D_{LF_1} and an upward-sloping supply curve S_{LF_1} intersecting at equilibrium interest rate r_1 and quantity Q_1 — this earns Point 1. Then show the effect of the increased government spending/borrowing from part (c)(i): the government's borrowing increases the demand for loanable funds, shifting D_{LF_1} rightward to D_{LF_2} (an equally valid alternative is showing the supply of loanable funds decreasing from S_{LF_1} to S_{LF_2}). Either shift raises the equilibrium real interest rate from r_1 to a higher r_2 — this earns Point 2.

Solution 1

(e)(i)

Mark scheme

- The price of previously issued bonds will DECREASE. Bond prices and interest rates move inversely: as the real interest rate rises from r_1 to r_2 , existing bonds with fixed coupon payments become less attractive relative to new, higher-rate bonds, so their market price falls.

Solution 1

(e)(ii)

Mark scheme

- The rate of long-run economic growth will **DECREASE**. Explanation: the increase in the real interest rate raises the cost of borrowing, which decreases investment spending on physical capital, human capital, and/or research and development. Since these are key drivers of an economy's productive capacity (they shift LRAS rightward over time), less investment in them slows the long-run growth rate.

Question 1

2023 Set 2 ■ Q1

1. The economy of Northland is in short-run equilibrium with an actual unemployment rate of 7% and an actual inflation rate of 1%. The natural unemployment rate in Northland is 5%.
 - (a) Using the relevant numerical values given, draw a correctly labeled graph of the short-run and long-run Phillips curves. Label the current short-run equilibrium point as X. Plot the relevant numerical values provided on the graph.
 - (b) Is the expected inflation rate greater than, less than, or equal to 1% ? Explain.
 - (c) Assume the marginal propensity to consume is 0.9.
 - (i) If the government decreases income taxes by \$20 billion, calculate the maximum change in aggregate demand. Show your work.
 - (ii) If instead the government increases spending by \$20 billion, calculate the maximum change in aggregate demand. Show your work.
 - (d) On your graph in part (a), show a possible new short-run equilibrium point labeled Z that would result if the government increases spending and there is no change in inflationary expectations.

Question 1

- (e) How would an increase in unemployment compensation affect aggregate demand in the short run? Explain.
- (f) Assume instead the government takes none of the preceding policy actions. (Northland is still in short-run equilibrium; the actual unemployment rate is 7%, the actual inflation rate is 1%, and the natural unemployment rate is 5%.) What will happen to each of the following in the long run?
- (i) The short-run aggregate supply curve. Explain.
 - (ii) The short-run Phillips curve
 - (iii) The actual unemployment rate

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

Solution 1

(a)

Mark scheme

- Graph with Inflation Rate (%) on the vertical axis and Unemployment Rate (%) on the horizontal axis. Point 1: a downward-sloping short-run Phillips curve (SRPC) is drawn and labeled. Point 2: a vertical long-run Phillips curve (LRPC) is drawn at the natural rate of unemployment (5%), and point X is plotted on the SRPC to the right of the LRPC at the actual unemployment rate (7%) and the actual inflation rate (1%).

Solution 1

(b)

Mark scheme

- The expected inflation rate is greater than 1%. Explanation: the actual unemployment rate (7%) is greater than the natural rate of unemployment (5%) — equivalently, the economy is in a recession/below full employment — which places the economy on the SRPC to the right of the LRPC, a position that occurs only when expected inflation exceeds the actual inflation rate (1%).

Solution 1

(c)(i)

Mark scheme

- Maximum $\Delta AD = -\$20 \text{ billion} \times \frac{-0.9}{1-0.9} = -\$20 \text{ billion} \times (-9) = \180 billion . The tax multiplier is $-\text{MPC}/(1-\text{MPC}) = -9$; a \$20 billion decrease in taxes raises aggregate demand by a maximum of \$180 billion. Full work (multiplier + arithmetic) is required for the point.

Solution 1

(c)(ii)

Mark scheme

- Maximum $\Delta AD = \$20 \text{ billion} \times \frac{1}{1-0.9} = \$20 \text{ billion} \times 10 = \200 billion . The spending multiplier is $1/(1-MPC) = 10$; a \$20 billion increase in government spending raises aggregate demand by a maximum of \$200 billion. Full work (multiplier + arithmetic) is required for the point.

Solution 1

(d)

Mark scheme

- On the same SRPC used in part (a), plot point Z to the left of point X (a lower unemployment rate and a higher inflation rate than X), reflecting the increase in aggregate demand from the expansionary fiscal policy in part (c), with no change in inflationary expectations.

Solution 1

(e)

Mark scheme

- Aggregate demand would increase. Explanation: an increase in unemployment compensation raises households' disposable income, which increases consumption spending — a component of aggregate demand.

Solution 1

(f)(i)

Mark scheme

- The short-run aggregate supply curve will shift to the right. Explanation: as the economy self-corrects from the recessionary gap (actual unemployment $7\% >$ natural rate 5%), input prices (e.g., nominal wages) and/or inflationary expectations decrease, lowering production costs and shifting SRAS rightward.

Solution 1

(f)(ii)

Mark scheme

- The short-run Phillips curve will shift to the left (inward), reflecting the fall in inflationary expectations and/or input prices as the economy self-corrects toward long-run equilibrium.

(f)(iii)

Mark scheme

- The actual unemployment rate will decrease, moving back toward the natural rate of unemployment (5%) as the self-correcting economy returns to long-run equilibrium.

Question 1

2022 Set 1 ■ Q1

1. Assume a country's economy is operating below full employment.
 - (a) Draw a correctly labeled graph of aggregate demand, short-run aggregate supply, and long-run aggregate supply, and show each of the following.
 - (i) The current equilibrium real output and price level, labeled as Y_1 and PL_1 , respectively
 - (ii) The full-employment output, labeled as Y_F
 - (b) Identify one fiscal policy action the country's government can take to restore full employment.
 - (c) Assume instead that no fiscal policy action is taken. Suppose a change in investment spending causes real GDP to increase by \$ 200 billion. Calculate the minimum change in investment spending that could have caused this increase in real GDP if the marginal propensity to save is 0.25. Show your work.
 - (d) Assume the output gap was initially \$ 800 billion. On your graph in part (a), show the short-run effect of the change in investment spending identified in part (c), labeling the new equilibrium real output as Y_2 and the new equilibrium price level as PL_2 .

Question 1

- (e) Given your answer to part (d), is the actual rate of unemployment greater than, less than, or equal to the natural rate of unemployment? Explain.
- (f) Assume that private savings now increase. Draw a correctly labeled graph of the loanable funds market and show the effect of the increase in private savings on the real interest rate.
- (g) Based solely on the change in the real interest rate shown in part (f), what will happen to each of the following?
- (i) Real GDP in the short run. Explain.
 - (ii) Long-run aggregate supply. Explain.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

Solution 1

(a)

Mark scheme

- Draw an AD-AS graph: downward-sloping AD_1 , upward-sloping $SRAS_1$ (axes: Price Level vertical, Real GDP horizontal), intersecting at price level PL_1 and real output Y_1 — 1 point. Add a vertical LRAS line positioned to the right of Y_1 , labeled Y_F (full-employment/potential output), showing $Y_1 < Y_F$ (a recessionary gap) — 1 point. Total 2 points for a correctly labeled graph showing both the current equilibrium (PL_1, Y_1) and full-employment output Y_F .

Solution 1

(b)

Mark scheme

- Any one expansionary fiscal policy action: an increase in government spending, a decrease in taxes, or an increase in transfer payments. 1 point for correctly identifying any one of these (each would increase aggregate demand, closing the recessionary gap and restoring full employment).

Solution 1

(c)

Mark scheme

- Minimum change in investment spending = $200 \text{ billion} \div (1/0.25) = 200 \text{ billion} \times 0.25 = 50 \text{ billion}$. *Show work: the spending multiplier = $1/MPS = 1/0.25 = 4$; $\Delta I = \Delta Y \div \text{multiplier} = 200 \text{ billion} \div 4 = 50 \text{ billion}$. 1 point for the correct answer (50 billion) with work shown.*

Solution 1

(d)

Mark scheme

- On the graph from part (a), shift AD_1 rightward to AD_2 (reflecting the increase in investment spending), intersecting $SRAS_1$ at a new equilibrium with a higher price level PL_2 ($PL_2 > PL_1$) and higher real output Y_2 ($Y_1 < Y_2 < Y_F$ — still below full-employment output). 1 point for a correctly shown rightward AD shift with PL_2 and Y_2 labeled at the new, higher intersection that remains left of Y_F .

Solution 1

(e)

Mark scheme

- The actual rate of unemployment is greater than the natural rate of unemployment. Explanation: because Y_2 is still less than Y_F (full-employment output), the economy remains in a recessionary gap — actual output is below potential output, so actual unemployment exceeds the natural rate. 1 point for the correct comparison (actual $>$ natural) together with this explanation.

Solution 1

(f)

Mark scheme

- Draw the loanable funds market: downward-sloping demand D_{LF_1} , upward-sloping supply S_{LF_1} (axes: Real Interest Rate vertical, Quantity of Loanable Funds horizontal), equilibrium at r_1 , Q_1 — 1 point. Shift the supply curve rightward ($S_{LF_1} \rightarrow S_{LF_2}$, reflecting the increase in private savings), producing a new equilibrium with a lower real interest rate r_2 ($r_2 < r_1$) and a higher quantity Q_2 — 1 point. Total 2 points.

Solution 1

(g)(i)

Mark scheme

- Real GDP will increase in the short run. Explanation: the lower real interest rate (from part f) reduces the cost of borrowing, increasing interest-sensitive spending (consumption, investment, and/or net exports), which increases aggregate demand and therefore short-run real GDP. 1 point for the correct direction (increase) with this explanation.

Solution 1

(g)(ii)

Mark scheme

- Long-run aggregate supply (LRAS) will increase. Explanation: the decrease in the real interest rate lowers the cost of borrowing, which increases investment spending on plant and equipment (capital formation); the resulting increase in the capital stock increases the economy's potential output, shifting LRAS rightward. 1 point for the correct direction (increase) with this explanation.

Question 1

2022 Set 2 ■ Q1

1. Assume the United States economy is in short-run macroeconomic equilibrium at an output level greater than potential output.
 - (a) Draw a correctly labeled graph of the aggregate demand, short-run aggregate supply, and long-run aggregate supply curves, and show each of the following.
 - (i) The current equilibrium real output and price level, labeled as Y_1 and PL_1 , respectively
 - (ii) The full-employment output, labeled as Y_F
 - (b) Assume government spending increases by \$100 billion. On your graph in part (a), show the short-run effect of the change in government spending on the equilibrium real output and price level. Label the new equilibrium output as Y_2 and the new equilibrium price level as PL_2 .
 - (c) Assume the marginal propensity to consume is 0.8. As a result of the increase in government spending, what is the numerical value of the maximum change in each of the following in the short run?
 - (i) Real output
 - (ii) Household savings

Question 1

- (d) Draw a correctly labeled graph of the money market and show the effect of the change in real output identified in part (c)(i) on the equilibrium nominal interest rate.
- (e) Based on the change in the nominal interest rate shown in part (d), what will happen to the prices of previously issued bonds in the short run?
- (f) The United States and the European Union are trading partners with flexible exchange rates. The currency in the United States is the dollar, and the currency in the European Union is the euro. Assume the inflation rate in the United States increases relative to the inflation rate in the European Union. As a result of the change in the United States inflation rate, what will happen to each of the following in the foreign exchange market?
- (i) The demand for dollars. Explain.
 - (ii) The international value of the dollar
- (g) Suppose the Federal Reserve attempts to keep the value of the dollar constant in the foreign exchange market. Based on the change in the value of the dollar in part (f)(ii), should the Federal Reserve buy or sell each of the following?

Question 1

- (i) The euro
- (ii) The dollar

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

Solution 1

(a) Mark scheme

- Draw an AD–AS graph: axes Price Level (vertical) and Real GDP (horizontal), with a downward-sloping AD_1 and an upward-sloping $SRAS_1$ intersecting at price level PL_1 and real output Y_1 (dashed lines to both axes) — 1 point. Second point: add a vertical LRAS curve positioned to the LEFT of Y_1 , with its base labeled Y_F (full-employment output), showing the economy currently producing above full employment ($Y_1 > Y_F$, an inflationary/expansionary gap) — 1 point. Total 2 points for a correctly labeled graph showing both the current equilibrium (PL_1, Y_1) and full-employment output Y_F .

Solution 1

(b)

Mark scheme

- On the graph from part (a), shift AD_1 rightward to AD_2 (an arrow indicating the shift), reflecting the increase in government spending. The new equilibrium is at the intersection of AD_2 and $SRAS_1$: real output rises to Y_2 ($Y_2 > Y_1$) and the price level rises to PL_2 ($PL_2 > PL_1$), both labeled with dashed lines to the axes. 1 point for correctly showing the rightward AD shift with both Y_2 and PL_2 labeled at the new, higher intersection.

Solution 1

(c)(i)

Mark scheme

- Maximum increase in real output = 500 billion. *Work : the spending multiplier = $1 \div (1 - MPC) = 1 \div (1 - 0.8) = 1 \div 0.2 = 5$. Maximum Δ Real Output = $\text{spending multiplier} \times \Delta \text{ Government Spending} = 5 \times 100 \text{ billion} = 500 \text{ billion}$. 1 point for the correct value (500 billion) with the multiplier calculation shown. (In the official scoring guidelines this single point is shared with part (c)(ii) — both the real-output and household-savings values are required together for the point.)*

Solution 1

(c)(ii)

Mark scheme

- Maximum increase in household savings = 100 billion. *Work* : $MPS = 1 - MPC = 1 - 0.8 = 0.2$. $Maximum \Delta Household Savings = MPS \times maximum \Delta Real Output (from part (c)(i)) = 0.2 \times 500 \text{ billion} = 100 \text{ billion}$ —equal to the initial increase in government spending, since with no taxes or import substitution (100 billion) with work shown. (Shares its official 1 point with part (c)(i); each value is graded here for its own point.)

Solution 1

(d) Mark scheme

- Draw a money-market graph: axes Nominal Interest Rate (vertical) and Quantity of Money (horizontal), with a vertical money supply curve MS_1 and a downward-sloping money demand curve MD_1 intersecting at nominal interest rate i_1 and quantity Q_1 (dashed lines to both axes) — 1 point. Second point: shift MD_1 rightward to MD_2 (an arrow indicating the shift), because the increase in real output from part (c)(i) raises money demand at every interest rate; the new equilibrium is at a higher nominal interest rate i_2 ($i_2 > i_1$, dashed line) at the same quantity Q_1 (MS is vertical/fixed) — 1 point. Total 2 points.

Solution 1

(e)

Mark scheme

- The price of previously issued bonds will DECREASE. Bond prices and interest rates move inversely, so the rise in the nominal interest rate shown in part (d) ($i_1 \rightarrow i_2$) causes the price of existing, fixed-coupon bonds to fall. 1 point.

Solution 1

(f)(i)

Mark scheme

- The demand for dollars will **DECREASE**. Explanation: the increase in the United States inflation rate (relative to the European Union) makes United States goods relatively more expensive than European goods, so Europeans buy fewer U.S. exports — reducing the quantity of dollars they need to demand in the foreign exchange market to purchase them. 1 point for stating the decrease **AND** giving this relative-price explanation.

Solution 1

(f)(ii)

Mark scheme

- The international value of the dollar will DEPRECIATE. Because the demand for dollars decreases (part (f)(i)) while the supply of dollars in the foreign exchange market is unchanged, the equilibrium price (value) of the dollar falls relative to the euro. 1 point.

Solution 1

(g)(i)

Mark scheme

- To keep the value of the dollar constant despite the depreciation pressure identified in part (f)(ii), the Federal Reserve should SELL euros in the foreign exchange market (increasing the supply of euros it offers in exchange for dollars). 1 point. (In the official scoring guidelines this is one combined point with part (g)(ii): 'sell the euro and buy the dollar' describes a single foreign-exchange intervention from two currency perspectives.)

Solution 1

(g)(ii)

Mark scheme

- Correspondingly, the Federal Reserve should BUY dollars in the foreign exchange market — using the euros it sells (part (g)(i)) to purchase dollars, which increases the demand for dollars and offsets the depreciation pressure from part (f)(ii), keeping the dollar's value constant. 1 point. (Shares its official 1 point with part (g)(i), the same single intervention stated from the dollar's side.)

Question 2

2021 Set 2 ■ Q2

2. An economy is currently in short-run equilibrium with a recessionary output gap of \$600 billion.
- (a) Draw a single correctly labeled graph with both the short-run and long-run Phillips curves. Label the initial short-run equilibrium point X.
- (b) Suppose the government implements fiscal policy in order to achieve full-employment output and the marginal propensity to consume is 0.75.
- (i) Calculate the minimum change in government spending required to increase aggregate demand by the amount of the output gap of \$600 billion. Show your work.
 - (ii) Suppose instead the government wants to change taxes rather than government spending. Calculate the minimum change in taxes required to increase aggregate demand by the amount of the output gap of \$600 billion. Show your work.

Question 2

(c) Assume instead the government takes no policy action to close the output gap shown in part (a). Explain how the economy will adjust in the long run.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

Solution 2

(a)

Mark scheme

- Draw a single correctly labeled graph with vertical axis = inflation rate (%), horizontal axis = unemployment rate (%), and a downward-sloping short-run Phillips curve (SRPC) (1 point). Second point: add a vertical long-run Phillips curve (LRPC) and label point X on the SRPC to the RIGHT of the LRPC (i.e., at an unemployment rate above the natural rate, with dashed lines from X to both axes). 2 points total: 1 for the correctly labeled SRPC graph, 1 for the LRPC plus point X correctly positioned to the right of it on the SRPC.

Solution 2

(b)(i)

Mark scheme

- Minimum change in government spending = 150 billion. Work : $\text{Spending multiplier} = 1/(1 - \text{MPC}) = 1/(1 - 0.75) = 1/0.25 = 4$. $\text{Change in government spending} = \text{Desired change in GDP} \div \text{Spending multiplier} = 600 \text{ billion} \div 4 = 150 \text{ billion}$. 1 point for the correct value (150 billion) with the multiplier work shown.

Solution 2

(b)(ii)

Mark scheme

- Minimum change in taxes = $-\$200$ billion (i.e., a $\$200$ billion tax CUT).
Work: Tax multiplier = $-MPC/(1 - MPC) = -0.75/(1 - 0.75) = -0.75/0.25 = -3$. Change in taxes = Desired change in GDP $\div$ Tax multiplier = $\$600$ billion $\div (-3) = -\$200$ billion. 1 point for the correct value (a $\$200$ billion decrease in taxes) with the multiplier work shown.

Solution 2

(c)

Mark scheme

- In the long run, SRAS will INCREASE (shift rightward), due to a decrease in nominal wages, input prices, or inflationary expectations, as the economy self-corrects from the inflationary/output gap back toward full-employment (potential) output. 1 point.

Question 1

2019 Set 1 ■ Q1

Canada is an open economy that is currently in a recessionary output gap.

(a)(i) Draw a correctly labeled graph of the long-run aggregate supply, short-run aggregate supply, and aggregate demand curves, and show the current equilibrium real output and price level, labeled as Y_1 and PL_1 , respectively.

(a)(ii) Draw a correctly labeled graph of the long-run aggregate supply, short-run aggregate supply, and aggregate demand curves, and show full-employment output, labeled Y_f .

Question 1

2019 Set 1 ■ Q1

Canada is an open economy that is currently in a recessionary output gap.

(b)(i) The central bank and the government do not take any policy actions to close the output gap. Explain how the economy will adjust to full employment in the long run.

(b)(ii) The central bank and the government do not take any policy actions to close the output gap. On your graph in part (a), show how the economy adjusts to full employment in the long run.

Question 1

2019 Set 1 ■ Q1

Canada is an open economy that is currently in a recessionary output gap.

(c)(i) Suppose the Canadian government is unwilling to wait for the long-run adjustment process. The marginal propensity to consume is 0.8. The equilibrium real output is 500 billion and the full-employment output is 540 billion. Calculate the minimum change and indicate the direction of change in government spending required to shift the aggregate demand curve by the amount of the output gap.

(c)(ii) Suppose the Canadian government is unwilling to wait for the long-run adjustment process. The marginal propensity to consume is 0.8. The equilibrium real output is 500 billion and the full-employment output is 540 billion. Calculate the minimum change and indicate the direction of change in taxes required to shift the aggregate demand curve by the amount of the output gap.

Question 1

2019 Set 1 ■ Q1

Canada is an open economy that is currently in a recessionary output gap.

(d) Assume instead that the Canadian central bank takes actions to restore the economy to full-employment output by influencing investment spending. Draw a correctly labeled graph of the money market, and show the effect of the actions taken by the central bank on the equilibrium interest rate.

Question 1

2019 Set 1 ■ Q1

Canada is an open economy that is currently in a recessionary output gap.

(e) Canada and Mexico are trading partners. Draw a correctly labeled graph of the foreign exchange market of the Canadian dollar, and show the effect of the change in the interest rate in part (d) on the value of the Canadian dollar with respect to the Mexican peso.

Solution 1

(a)(i)

Mark scheme

- Draw a downward-sloping aggregate demand curve (AD1) and an upward-sloping short-run aggregate supply curve (SRAS1) on a graph with Price Level on the vertical axis and Real GDP on the horizontal axis. Their intersection is the current short-run equilibrium: drop dashed lines to the axes and label the equilibrium price level PL1 and the equilibrium real output Y1. 1 point for a correctly labeled AD1/SRAS1 graph with the equilibrium point marked Y1 and PL1.

Solution 1

(a)(ii)

Mark scheme

- On the same graph, add a vertical long-run aggregate supply curve (LRAS) positioned to the right of Y_1 (Canada is in a recessionary output gap, so full-employment output exceeds current output). Label the output level where LRAS meets the horizontal axis as Y_f , with $Y_f > Y_1$. 1 point for a correctly labeled vertical LRAS curve with Y_f shown to the right of Y_1 .

Solution 1

(b)(i)

Mark scheme

- With no policy action, the recessionary gap ($Y_1 < Y_f$) means unemployment is above the natural rate, putting downward pressure on nominal wages, other input prices, and/or expected inflation. As these fall over time, the short-run aggregate supply curve shifts rightward, lowering the price level and raising real output until the economy self-corrects back to full employment at Y_f . 1 point for explaining that falling nominal wages/input prices/expected inflation shift SRAS rightward until real GDP returns to Y_f .

Solution 1

(b)(ii)

Mark scheme

- On the graph from part (a), draw a new short-run aggregate supply curve, SRAS2, to the right of SRAS1, such that AD1, SRAS2, and LRAS all intersect at the same point directly above Y_f (at a lower price level than PL1). 1 point for showing SRAS shifting rightward until it intersects AD1 and LRAS exactly at Y_f .

Solution 1

(c)(i)

Mark scheme

- Output (recessionary) gap = $Y_f - Y_1 = 540 \text{ billion} - 500 \text{ billion} = 40 \text{ billion}$. $\text{Spending multiplier} = 1/(1 - MPC) = 1/(1 - 0.8) = 1/0.2 = 5$. $\text{Minimum change in government spending} = \text{output gap} / \text{multiplier} = 40 \text{ billion} / 5 = 8 \text{ billion}$. Government spending must INCREASE by 8 billion. 1 point for the correct calculation ($40B/5 = 8B$) and the correct direction (increase).

Solution 1

(c)(ii)

Mark scheme

- Tax multiplier = $-MPC / (1 - MPC) = -0.8 / 0.2 = -4$. Minimum change in taxes = output gap / tax multiplier = \$40 billion / $(-4) = -\$10$ billion. Taxes must DECREASE by \$10 billion. 1 point for the correct calculation ($\$40B / -4 = -\$10B$) and the correct direction (decrease).

Solution 1

(d) Mark scheme

- Draw the money market with Nominal Interest Rate on the vertical axis and Quantity of Money on the horizontal axis: a vertical money supply curve MS1 and a downward-sloping money demand curve MD, intersecting at interest rate r_1 (1 point for the correctly labeled base graph). To raise investment spending and close the recessionary gap, the central bank conducts expansionary monetary policy (e.g., buys bonds / lowers the required reserve ratio / lowers the discount rate), increasing the money supply and shifting it rightward to MS2; the new equilibrium nominal interest rate r_2 is lower than r_1 (1 point for showing MS shifting right and the resulting lower equilibrium interest rate).

Solution 1

(e) Mark scheme

- Draw the foreign exchange market for the Canadian dollar with the exchange rate (Mexican Pesos per Canadian Dollar) on the vertical axis and the Quantity of Canadian Dollars on the horizontal axis: an upward-sloping supply curve S_1 and a downward-sloping demand curve D_1 , intersecting at exchange rate e_1 and quantity Q_1 (1 point for the correctly labeled base graph). Because the Canadian nominal interest rate fell in part (d), Canadian assets become less attractive relative to foreign assets, so foreign demand for Canadian dollars decreases (demand shifts left to D_2) – or equivalently, Canadians supply more dollars to buy foreign assets (supply shifts right to S_2). Either shift lowers the equilibrium exchange rate to e_2

Solution 1

< e1: the Canadian dollar DEPRECIATES against the Mexican peso (1 point for showing the correct shift and that the Canadian dollar depreciates).

Question 1

2015 ■ Q1

MACROECONOMICS

Section II

Planning Time—10 minutes

Writing Time—50 minutes

Directions: You have 10 minutes to read all of the questions in this booklet, to sketch graphs, to make notes, and to plan your answers. You will then have 50 minutes to answer all three of the following questions. It is suggested that you spend approximately half your time on the first question and divide the remaining time equally between the next two questions. Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. Use a pen with black or dark blue ink.

1. Assume that the United States economy is operating below full employment.
 - (a) Draw a correctly labeled graph of long-run aggregate supply, short-run aggregate supply, and aggregate demand, and show each of the following.

Question 1

- (i) Current equilibrium output and price level, labeled as Y_1 and PL_1
 - (ii) Full-employment output, labeled as Y_f
- (b) Assume that the Federal Reserve targets a new federal funds rate to reach full employment. Should the Federal Reserve target a higher or lower federal funds rate?
- (c) Given the Federal Reserve action you identified in part (b), draw a correctly labeled graph of the money market and show the effect on the nominal interest rate.
- (d) The policy makers pursue a fiscal policy rather than the monetary policy in part (b). Assume that the marginal propensity to consume is 0.8 and the value of the recessionary gap is \$300 billion.
 - (i) If the government changes its spending without changing taxes to eliminate the recessionary gap, calculate the minimum required change in government spending.
 - (ii) If the government changes taxes without changing government spending to eliminate the recessionary gap, will the minimum required change in taxes be greater than, smaller than, or equal to the minimum required change in government spending in part (d)(i) ? Explain.
- (e) Assume the government lowers income tax rates to eliminate the recessionary gap. Will each of the following increase, decrease, or stay the same?

Question 1

- (i) Aggregate demand. Explain.
- (ii) Long-run aggregate supply. Explain.

Solution 1

(a)

Mark scheme

- Setup/instruction for the graph — no separate credit. Draw axes with Price Level (vertical) and Real GDP (horizontal); a downward-sloping AD curve and an upward-sloping SRAS curve. Credit for this graph is earned via parts (a)(i) (initial equilibrium labels Y_1 , PL_1) and (a)(ii) (LRAS placement) below.

Solution 1

(a)(i)

Mark scheme

- Label the initial equilibrium — where AD intersects SRAS — as Y_1 on the real-GDP axis and PL_1 on the price-level axis. One point is earned for a correctly labeled graph showing AD, SRAS, Y_1 , and PL_1 .

Solution 1

(a)(ii)

Mark scheme

- Draw a vertical long-run aggregate supply (LRAS) curve at Y_f , positioned to the right of Y_1 (the economy starts in a recessionary gap, so $Y_1 < Y_f$). One point is earned for drawing a vertical LRAS at Y_f to the right of Y_1 .

Solution 1

(b)

Mark scheme

- The Federal Reserve should target a LOWER federal funds rate. A lower target rate is expansionary monetary policy, needed to close the recessionary gap ($Y_1 < Y_f$) and move the economy toward full employment. One point is earned for stating 'lower.'

Solution 1

(c)

Mark scheme

- Draw a correctly labeled money market graph: vertical axis = nominal interest rate, horizontal axis = quantity of money, with a downward-sloping money demand (MD) curve and vertical money supply curves MS_1/MS_2 . To lower the federal funds rate, the Fed increases the money supply — shift MS_1 right to MS_2 (from M_1 to M_2), lowering the nominal interest rate from r_1 to r_2 . One point for a correctly labeled graph; one point for shifting money supply right and showing the resulting decrease in the nominal interest rate.

Solution 1

(d)

Mark scheme

- Setup only — no separate credit. Given: $MPC = 0.8$ (so $MPS = 0.2$) and a recessionary gap of \\$300 billion. These numbers are used in parts (d)(i) and (d)(ii) below.

(d)(i)

Mark scheme

- Spending multiplier $= 1/MPS = 1/0.2 = 5$. Minimum required change in government spending $= \text{recessionary gap} \div \text{spending multiplier}$
 $= \$300 \text{ billion} / 5 = \60 billion . One point is earned for this calculation.

Solution 1

(d)(ii)

Mark scheme

- The minimum required change in taxes will be GREATER than the minimum required change in government spending from part (d)(i). Explanation: the tax multiplier = $MPC/MPS = 0.8/0.2 = 4$ is smaller in magnitude than the government-spending multiplier = $1/MPS = 1/0.2 = 5$, because part of the initial increase in disposable income from a tax cut is saved rather than spent — only the MPC share is spent — so a larger tax cut than spending increase is needed to close the same gap. One point for stating 'greater than'; one point for this multiplier explanation.

Solution 1

(e)

Mark scheme

- Setup only — the government lowers income tax rates to eliminate the recessionary gap; effects on (e)(i) aggregate demand and (e)(ii) long-run aggregate supply are graded separately below.

Solution 1

(e)(i)

Mark scheme

- Aggregate demand will INCREASE. Explanation: lower income tax rates raise households' disposable income, which increases consumption and/or investment, shifting AD to the right. One point is earned for stating AD increases with this explanation.

Solution 1

(e)(ii)

Mark scheme

- Long-run aggregate supply — any ONE of the following earns the point: (1) LRAS stays the SAME, because lowering income taxes raises consumption/investment (demand-side) but does not change the economy's inputs (labor, capital, technology, resources); OR (2) LRAS INCREASES in the long run, because lower taxes raise savings and investment in physical capital, or increase incentives to work; OR (3) LRAS DECREASES in the long run, because lower taxes cause crowding out of private investment. One point is earned for stating and explaining any one of these three positions.

Question 1

2014 ■ Q1

MACROECONOMICS

Section II

Planning Time—10 minutes

Writing Time—50 minutes

Directions: You have 10 minutes to read all of the questions in this booklet, to sketch graphs, to make notes, and to plan your answers. You will then have 50 minutes to answer all three of the following questions. It is suggested that you spend approximately half your time on the first question and divide the remaining time equally between the next two questions. In answering the questions, you should emphasize the line of reasoning that generated your results; it is not enough to list the results of your analysis. Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. Use a pen with black or dark blue ink.

1. Assume that the United States economy is currently operating below the full-employment level of real gross domestic product with a balanced budget.

Question 1

- (a) Draw a correctly labeled graph of aggregate demand, short-run aggregate supply, and long-run aggregate supply, and show each of the following in the United States.
 - (i) Current output and price level, labeled as Y_1 and PL_1 , respectively
 - (ii) Full-employment output, labeled as Y_f
- (b) The United States government increases spending on goods and services by \$100 billion, which is financed by borrowing. How will the increase in government spending affect each of the following?
 - (i) Cyclical unemployment
 - (ii) The natural rate of unemployment
- (c) If the marginal propensity to consume is equal to 0.75, calculate the maximum possible change in real gross domestic product that could result from the \$100 billion increase in government spending.
- (d) Using a correctly labeled graph of the loanable funds market, show the effect of the \$100 billion increase in government spending on the real interest rate.
- (e) Based on the real interest rate change in part (d), what is the effect on the long-run economic growth rate? Explain.

Question 1

- (f) Now assume that instead of financing the \$100 billion increase in government spending by borrowing, the United States government increases taxes by \$100 billion. With this equal increase in government spending and taxes, will the real gross domestic product increase, decrease, or remain the same? Explain.

Solution 1

(a) Mark scheme

- Draw a correctly labeled graph with Price Level on the vertical axis and Real GDP on the horizontal axis: a downward-sloping AD curve and an upward-sloping SRAS curve intersecting at price level PL_1 and output Y_1 (both labeled). Draw a vertical LRAS curve at full-employment output Y_f , positioned to the right of the AD-SRAS intersection (showing the economy operating below full employment, i.e., a recessionary gap: $Y_1 < Y_f$). 1 point for a correctly labeled graph showing the AD-SRAS equilibrium with Y_1 and PL_1 labeled; 1 point for a vertical LRAS at Y_f drawn to the right of that intersection.

Solution 1

(b)

Mark scheme

- (i) Cyclical unemployment will decrease: the \$100 billion increase in government spending shifts AD to the right, raising real output toward Y_f and closing (part of) the recessionary gap, which reduces cyclical unemployment. (ii) The natural rate of unemployment will not change: it reflects frictional and structural unemployment determined by labor-market institutions and search/matching factors, not by short-run aggregate demand policy. 1 point for each correct answer (cyclical unemployment decreases; natural rate unchanged).

Solution 1

(c)

Mark scheme

- Spending multiplier = $\$1/(1-MPC) = 1/(1-0.75) = 1/0.25 = 4\$$. Maximum possible change in real GDP = $\$4 \times \$100\text{ billion} = \$400\text{ billion}\$$. 1 point is earned for correctly calculating and stating the \$400 billion change in real GDP (showing the multiplier calculation).

Solution 1

(d) Mark scheme

- Draw a loanable funds market graph with the real interest rate on the vertical axis and quantity of loanable funds on the horizontal axis, with an upward-sloping supply curve (S) and downward-sloping demand curve (D) intersecting at real interest rate r and quantity Q . Financing the \$100 billion increase in government spending by borrowing increases government demand for loanable funds, shifting the demand curve right from D to D' (quantity to Q'); equivalently, some solutions show the supply of loanable funds curve shifting left (S to S', from Q to Q'). Either way, the new equilibrium real interest rate r' is higher than r . 1 point for a correctly labeled loanable funds graph; 1 point for shifting demand right (or supply left) and showing an increase in the real interest rate.

Solution 1

(e)

Mark scheme

- The long-run economic growth rate will fall (decrease). Explanation: the higher real interest rate found in part (d) raises the cost of borrowing for firms, which crowds out private investment spending; less investment means slower capital formation (a smaller/slower-growing capital stock), and since capital accumulation drives long-run growth, the long-run economic growth rate slows. 1 point for stating the growth rate will fall; 1 point for explaining that the higher real interest rate slows capital formation (crowding out investment).

Solution 1

(f) Mark scheme

- Real gross domestic product will increase. Explanation: when government spending and taxes both rise by the same \$100 billion, the expansionary effect of the spending increase (spending multiplier $\$1/(1-MPC)\$$, applied to the full \$100 billion) outweighs the contractionary effect of the tax increase (tax multiplier $\$-MPC/(1-MPC)\$$, smaller in magnitude because part of any tax change is absorbed by saving rather than spending). Acceptable equivalents: the balanced-budget multiplier equals 1, so GDP rises by the full \$100 billion net increase; or simply that the tax multiplier is smaller in absolute value than the spending multiplier. 1 point for stating real GDP increases; 1 point for a correct explanation of why the spending effect dominates the tax effect.