Name: _____

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Intermediate Macroeconomics — Practice Exam

Instructions: Part A: answer ALL 30 multiple-choice questions (2 points each). Each question has four options, A to D, of which exactly one is correct. Part B: answer ALL 4 questions (10 points each) and show your working. A calculator may be used. Time allowed: 120 minutes.

Time Limit: 120 minutes

Multiple Choice (30 questions)

[2 points] 1. An economy's nominal GDP was 2,400 billion in year 1 and 2,646 billion in year 2. Its real GDP, measured in the prices of base year 0, was 2,000 billion in year 1 and 2,100 billion in year 2. The GDP deflator in year 2 and the inflation rate between years 1 and 2, measured by the deflator, are:

A. deflator 126; inflation 6 percent

B. deflator 126; inflation 26 percent

C. deflator 126; inflation 5 percent

D. deflator 79.4; inflation 5 percent

[2 points] 2. In an open economy, output is $Y = 5{,}000$, consumption $C = 3{,}200$, investment $I = 900$, government purchases $G = 1{,}000$ and taxes net of transfers $T = 900$ (all in billions). National saving and net exports are:

A. national saving 800; net exports -100

B. national saving 800; net exports $+100$

C. national saving 900; net exports 0

D. national saving 1,000; net exports $+100$

[2 points] 3. The prices of imported cars, in domestic currency, rise by 20 percent, while the prices of all domestically produced goods and services are unchanged. Consumers spend part of their budget on imported cars. Compared with the GDP deflator, the consumer price index (CPI) will:

A. rise by the same amount as the GDP deflator, since both measure the price level

B. rise, while the GDP deflator stays the same, since imports are not in GDP

C. stay the same, while the GDP deflator rises, since the deflator covers all goods

D. fall, because consumers substitute away from the imported cars

[2 points] 4. In the Solow model without technological progress, output per worker is $y = \sqrt{k}$, where k is capital per worker. The saving rate is 20 percent, the depreciation rate 7 percent and the population growth rate 3 percent a year. Steady-state capital per worker and consumption per worker are:

A. $k^* = 8.16$ and $c^* = 2.29$
B. $k^* = 2$ and $c^* = 1.13$
C. $k^* = 4$ and $c^* = 0.4$
D. $k^* = 4$ and $c^* = 1.6$

[2 points] 5. An economy has the production function $Y = K^{0.3}N^{0.7}$, no technological progress and a saving rate of 20 percent. Which statement about the Golden Rule level of capital is correct?

A. It is reached with a saving rate of 30 percent; moving there cuts consumption at first and raises it later
B. It is reached with a saving rate of 70 percent, labour's share of income, so this economy saves far too little
C. It is reached with a saving rate of 30 percent; moving there raises consumption in every period, including now
D. It is reached with a saving rate of 100 percent, because more capital always yields more output and consumption

[2 points] 6. In the Solow model with no technological progress, the saving rate rises permanently from 20 to 25 percent. Compared with the old steady state, the new steady state has:

A. a permanently higher growth rate of output per worker
B. the same output per worker, because diminishing returns cancel the extra investment
C. a higher level of output per worker but the same long-run growth rate (zero)
D. lower output per worker, because households consume a smaller share of income

[2 points] 7. In the Solow model with labour-augmenting technological progress, technology grows at 2 percent and the labour force at 1 percent a year. On the balanced growth path, the growth rates of capital per effective worker $K/(AN)$, output per worker Y/N and total output Y are:

A. 0, 0 and 1 percent
B. 0, 2 and 3 percent
C. 2, 2 and 3 percent
D. 0, 3 and 3 percent

[2 points] 8. In the Solow model with no technological progress, the population growth rate rises permanently from 1 to 2 percent a year, with the saving and depreciation rates unchanged. In the new steady state:

A. capital and output per worker are lower, and total output grows faster
B. capital and output per worker are unchanged, because the saving rate is unchanged
C. capital per worker is higher, because more workers means more total saving
D. output per worker falls by 1 percent a year forever

[2 points] 9. Over a decade, an economy's real output grew at 3.5 percent a year, its capital stock at 4 percent and its labour input at 1.5 percent. Capital's share of income is 0.3. According to growth accounting, total factor productivity (the Solow residual) grew at about:

A. 0.25 percent a year
B. 2.3 percent a year
C. −2.0 percent a year
D. 1.25 percent a year

[2 points] 10. In a closed-economy Keynesian cross, consumption is $C = c_0 + 0.8\,(Y - T)$, taxes are $T = 0.25\,Y$, and investment and government purchases are exogenous. If government purchases rise by 40 billion, equilibrium output rises by:

A. 200 billion
B. 160 billion
C. 100 billion
D. 40 billion

[2 points] 11. In a closed-economy Keynesian cross with $C = c_0 + 0.75\,(Y - T)$, lump-sum taxes and exogenous investment, the government raises both its purchases and lump-sum taxes by 50 billion. Equilibrium output:

A. does not change, because the extra spending is fully paid for
B. rises by 50 billion
C. rises by 200 billion
D. falls by 150 billion

[2 points] 12. In a closed-economy Keynesian cross with exogenous investment, unchanged government purchases and lump-sum taxes, households decide to save more at every level of income (autonomous consumption c_0 falls). In the new equilibrium:

A. output is unchanged and saving is higher, because the extra saving finances more investment
B. output falls and saving rises by the full amount households intended
C. output falls and total saving ends up unchanged
D. output rises, because lower consumption frees resources for investment

[2 points] 13. In one version of the IS-LM model the central bank holds the money supply fixed, so the LM curve slopes upward; in another it holds the interest rate fixed, so the LM curve is horizontal. If government purchases rise, then:

A. output rises by the same amount in both versions, because the IS shift is the same
B. output rises by more with a fixed money supply, because the higher interest rate raises saving
C. output does not change with a fixed money supply, because crowding out is complete
D. output rises by more with a fixed interest rate, because investment is not crowded out

[2 points] 14. The nominal policy interest rate is at zero and cannot fall further (the zero lower bound, or liquidity trap). In the IS-LM model:

A. an increase in the money supply lowers the interest rate and raises output
B. more money leaves output unchanged, while a fiscal expansion raises it
C. neither a monetary nor a fiscal expansion can raise output at all
D. a fiscal expansion is fully crowded out by a rise in the interest rate

[2 points] 15. Policy makers want to raise investment while keeping output unchanged. In the IS-LM model, which policy mix achieves this?

A. A fiscal contraction combined with a monetary expansion
B. A fiscal expansion combined with a monetary contraction
C. A fiscal expansion combined with a monetary expansion
D. A fiscal contraction combined with a monetary contraction

[2 points] 16. In the closed-economy IS-LM model with a fixed nominal money supply, the aggregate demand curve slopes downward in (Y, P) space because a lower price level:

A. makes domestic goods cheaper relative to substitutes, so consumers buy more of them
B. raises firms' markups, so they choose to produce more
C. lowers the real value of government debt, so taxes can be cut
D. raises real money balances, which lowers the interest rate and raises investment

[2 points] 17. A rise in the price of oil shifts the short-run aggregate supply curve up (to the left) but leaves the natural level of output unchanged. If the central bank responds by expanding aggregate demand just enough to keep output at its natural level, then:

A. output stays at its natural level and the price level stays permanently higher
B. output and the price level both return to their original levels
C. output falls permanently below its natural level
D. the price level falls back to its old level while output rises above its natural level

[2 points] 18. Wage setting is described by $\frac{W}{P} = 1 - 4u + z$, where u is the unemployment rate (as a decimal) and $z = 0.1$ captures other factors such as unemployment benefits. Price setting is $P = (1 + m)\, W$ with a markup of $m = 0.25$. The natural rate of unemployment and the real wage are:

A. $u_n = 5.0\%$ and $W/P = 0.80$
B. $u_n = 8.75\%$ and $W/P = 0.75$
C. $u_n = 7.5\%$ and $W/P = 0.80$
D. $u_n = 7.5\%$ and $W/P = 1.25$

[2 points] 19. The Phillips curve is $\pi_t = \pi_t^e - 0.5\,(u_t - u_n)$, with a natural rate of $u_n = 5$ percent. Expected inflation is 3 percent and the unemployment rate is 3 percent. Inflation is:

A. 2.0 percent
B. 4.0 percent
C. 1.0 percent
D. 5.0 percent

[2 points] 20. The Phillips curve is $\pi_t = \pi_t^e - 0.5\,(u_t - 5)$ and expectations are adaptive: $\pi_t^e = \pi_{t-1}$. Inflation was 2 percent in year 0. From year 1 onward the government holds unemployment at 4 percent. Inflation in year 3 is:

A. 2.5 percent

B. 2.0 percent

C. 5.0 percent

D. 3.5 percent

[2 points] 21. The Phillips curve is $\pi_t - \pi_{t-1} = -0.4\,(u_t - u_n)$ and, by Okun's law, each point of unemployment above the natural rate costs 1.5 percent of potential output for that year. To bring inflation down from 7 percent to 3 percent, the economy needs, in total:

A. 10 point-years of excess unemployment, and an output loss of 15 percent of one year's GDP

B. 4 point-years of excess unemployment, one per point of disinflation, and an output loss of 6 percent of one year's GDP

C. 1.6 point-years of excess unemployment, and an output loss of 2.4 percent of one year's GDP

D. 10 point-years of excess unemployment, and an output loss of 6.7 percent of one year's GDP

[2 points] 22. Expected inflation is firmly anchored at the central bank's 2 percent target, so that $\pi_t^e = 2$ percent whatever inflation was in the past. With the Phillips curve $\pi_t = \pi_t^e - 0.5\,(u_t - u_n)$, if unemployment is held 1 point below the natural rate for several years, inflation will:

A. rise by 0.5 points every year for as long as unemployment stays low

B. stay at 2 percent, because anchored expectations rule out any trade-off

C. settle at 2.5 percent and stay there

D. fall below 2 percent, because the central bank's credibility restrains wage demands

[2 points] 23. Uncovered interest parity holds between two countries with free capital movement. One-year government bonds pay 5 percent in the home country and 2 percent abroad. Over the coming year, financial markets must expect the home currency to:

A. appreciate by about 3 percent against the foreign currency

B. depreciate by about 3 percent against the foreign currency

C. depreciate by about 7 percent against the foreign currency

D. stay unchanged, because capital flows have equalised returns

[2 points] 24. A basket of goods costs 220 dollars in the United States and 160 euros in the euro area, and one euro costs 1.25 dollars. Measured as the number of euro-area baskets that one US basket buys, the real exchange rate is:

A. 1.375

B. 1.10

C. 0.91

D. 1.72

[2 points] 25. In the Mundell-Fleming model of a small open economy with perfect capital mobility, a floating exchange rate and a fixed money supply, the government raises its purchases. The result is that:

A. output rises by the full Keynesian-cross multiplier and the exchange rate is unchanged
B. output rises and the domestic interest rate rises above the world rate
C. output is unchanged; the currency depreciates and net exports rise
D. output is unchanged; the currency appreciates and net exports fall

[2 points] 26. Under a fixed exchange rate with perfect capital mobility, a central bank buys domestic bonds in an attempt to raise output. In the Mundell-Fleming model:

A. output rises by as much as it would in a closed economy with the same LM shift
B. the domestic interest rate stays below the world rate for good, raising investment
C. defending the peg reverses the purchase, so money and output end where they began
D. the currency appreciates, so net exports fall and output falls too

[2 points] 27. According to the "impossible trinity" (the policy trilemma), which combination of policies CANNOT be maintained at the same time?

A. A fixed exchange rate, free capital movement and an independent monetary policy
B. A floating exchange rate, free capital movement and an independent monetary policy
C. A fixed exchange rate, capital controls and an independent monetary policy
D. A fixed exchange rate, free capital movement and monetary policy that follows the anchor country

[2 points] 28. Government debt is 90 percent of GDP. The real interest rate on the debt is 3 percent, real GDP grows at 1 percent a year, and the government runs a primary deficit (spending excluding interest, minus taxes) of 2 percent of GDP. Using $\Delta b \approx (r - g)\, b + d$, next year's debt-to-GDP ratio will be about:

A. 92.0 percent
B. 94.7 percent
C. 91.8 percent
D. 93.8 percent

[2 points] 29. A central bank follows the Taylor rule $i = r^{*} + \pi + 0.5\,(\pi - \pi^{*}) + 0.5\,x$, where $r^{*} = 2$ percent is the neutral real interest rate, $\pi^{*} = 2$ percent is the inflation target and x is the output gap in percent. Inflation is 4 percent and output is 1 percent below potential. The rule sets the policy rate at:

A. 7.5 percent
B. 6.5 percent
C. 2.5 percent
D. 4.5 percent

[2 points] 30. The government cuts lump-sum taxes by 100 billion in period 1 and finances the cut by issuing bonds, which it will repay with interest in period 2 by raising taxes. Government purchases are unchanged. If Ricardian equivalence holds:

A. consumption rises by the marginal propensity to consume times 100 billion

B. national saving falls by 100 billion and the interest rate rises

C. private saving rises by 100 billion and consumption is unchanged

D. the tax cut raises output through the tax multiplier, with no effect on saving

Short Answer (4 questions)

[10 points] 31. The Solow model with technological progress. An economy has the production function $Y = K^{1/2}(AN)^{1/2}$, where A is labour-augmenting technology. The saving rate is $s = 0.24$, capital depreciates at $\delta = 0.04$ a year, the labour force grows at $n = 0.01$ and technology grows at $g = 0.03$. Let $k = K/(AN)$ and $y = Y/(AN)$ denote capital and output per effective worker.

[3 points] (a) Show that $y = \sqrt{k}$, write down the equation for the change in k, and find the steady-state values of k, y and consumption per effective worker c.

[2 points] (b) On the balanced growth path, at what rate does each of the following grow: capital per effective worker, output per worker Y/N, capital per worker K/N, and total output Y? What does this imply about the source of long-run growth in living standards?

[3 points] (c) Find the Golden Rule level of capital per effective worker, the saving rate that achieves it, and the Golden Rule level of consumption per effective worker. Is this economy saving too much or too little?

[2 points] (d) The saving rate rises permanently to the Golden Rule rate. Describe what happens to consumption per effective worker immediately and in the long run, and to the growth rate of output per worker during the transition and in the long run.

[10 points] 32. IS-LM and aggregate demand. A closed economy is described by: consumption $C = 200 + 0.75\,(Y - T)$; investment $I = 400 - 50\,r$; government purchases $G = 300$; lump-sum taxes $T = 200$; real money demand $\left(\frac{M}{P}\right)^d = 0.5\,Y - 100\,r$. The nominal money supply is $M = 2{,}400$ and the price level is $P = 3$. The interest rate r is measured in percent (so $r = 4$ means 4 percent).

[2 points] (a) Derive the IS and LM curves and find the equilibrium output, interest rate and investment.

[3 points] (b) Government purchases rise by 100 to $G = 400$, with the money supply unchanged. Find the new output, interest rate and investment. Compare the rise in output with the Keynesian-cross multiplier and explain the difference.

[2 points] (c) Suppose instead that the central bank keeps the interest rate at 3.5 percent (a horizontal LM curve, as in textbooks that model the central bank as setting the interest rate). What is output after the rise in G, and by how much must the nominal money supply change?

[3 points] (d) Return to a fixed nominal money supply $M = 2{,}400$ and let the price level vary. Derive the aggregate demand curve for $G = 300$ and for $G = 400$. Potential output is $\bar{Y} = 2{,}300$. With $G = 400$, find the long-run price level, interest rate and investment once prices have fully adjusted, and comment on crowding out.

[10 points] 33. The Phillips curve and disinflation. An economy's Phillips curve is $\pi_t = \pi_t^e - 0.5\,(u_t - u_n)$ with a natural rate of $u_n = 5$ percent, and expectations are adaptive: $\pi_t^e = \pi_{t-1}$. Okun's law says that each percentage point of unemployment above the natural rate puts output 2 percent below potential: $\frac{Y_t - \bar{Y}}{\bar{Y}} = -2\,(u_t - u_n)$. Inflation has been stable at 8 percent for several years.

[2 points] (a) What is the unemployment rate? Explain how stable inflation tells you this, and why the long-run Phillips curve is vertical.

[3 points] (b) The central bank decides to reduce inflation to 2 percent by cutting it 1.5 points a year for four years. What unemployment rate is needed in each of those years, how large is the output gap each year, and what is the sacrifice ratio (percent of a year's GDP lost per point of disinflation)?

[2 points] (c) Instead, the central bank cuts inflation from 8 to 2 percent in a single year ("cold turkey"), with expectations still adaptive. What unemployment rate is needed that year, and how does the total output loss compare with part (b)?

[3 points] (d) Now suppose the central bank's announcement is fully credible, so that expected inflation falls to 2 percent at once. What unemployment rate is needed? Give two reasons why, in practice, disinflations have rarely been costless, and refer to the United States disinflation of the early 1980s.

[10 points] 34. Government debt dynamics. Let b_t be the ratio of government debt to GDP at the end of year t, d_t the primary deficit (government spending excluding interest, minus taxes) as a share of GDP, r the real interest rate on the debt and g the growth rate of real GDP. The debt ratio evolves as $b_t = \frac{1+r}{1+g}\, b_{t-1} + d_t$, which is approximately $b_t - b_{t-1} \approx (r-g)\, b_{t-1} + d_t$. Debt is 100 percent of GDP, $r = 4$ percent, $g = 2$ percent and the primary deficit is 1 percent of GDP.

[2 points] (a) Calculate next year's debt ratio, using both the approximation and the exact formula.

[3 points] (b) What primary balance would keep the debt ratio constant at 100 percent? How large a fiscal adjustment (change in the primary balance, as a share of GDP) does that require?

[3 points] (c) Suppose instead that $r = 0.5$ percent and $g = 3$ percent, and that, starting from the debt ratio of 100 percent, the government runs a primary deficit of 1.5 percent of GDP every year. Using the approximation, does the debt ratio rise without limit or settle down? If it settles, find the level it approaches, and explain what would happen if r later rose above g.

[2 points] (d) Between 1946 and the mid-1970s, United States federal debt held by the public fell from about 106 percent of GDP to under 30 percent. Using the debt-dynamics equation, list the forces that can lower a debt ratio, and explain how inflation that lenders did not expect contributes.



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