MACROECONOMIC THEORY I
ECO2142B - Fall 2018
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Practice Questions for the Final Exam 2

1. Consider the $AD - AS$ model built from the $IS - LM$, and assume that the $SRAS$ is upward sloping. If the government implements a new tax credit to investment in physical capital

a. in the short run, output will increase while the price level and the real interest rate will decrease.

b. in the short run, output and the price level will increase while the real interest rate will decrease.

c. in the short run, output and consumption will decrease while the real interest rate will increase.

d. in the short run, output, consumption, and the real interest rate will increase.

2. Consider the relationship between the Keynesian cross diagram and the IS curve. Assume that Y_1 and Y_2 are two equilibrium points in the market for goods and services, corresponding to two different values of the government spending, G_1 and G_2, with $G_1 < G_2$. Which of the following statements is true?

a. At any value of the real interest rate r, the points $\{r, Y_1\}$ and $\{r, Y_2\}$ will be on the same IS curve, with $Y_2 < Y_1$.

b. At any value of the real interest rate r, the points $\{r, Y_1\}$ and $\{r, Y_2\}$ will be on the same IS curve, with $Y_2 > Y_1$.

c. At any value of the real interest rate r, the points $\{r, Y_1\}$ and $\{r, Y_2\}$ will be on two different IS curves, and the IS curve passing through the $\{r, Y_2\}$ point will be to the right of the IS curve passing through the $\{r, Y_1\}$ point.

d. At any value of the real interest rate r, the points $\{r, Y_1\}$ and $\{r, Y_2\}$ will be on two different IS curves, and the IS curve passing through the $\{r, Y_2\}$ point will be to the left of the IS curve passing through the $\{r, Y_1\}$ point.

3. Consider the $AD - AS$ model built from the $IS - LM$, with an upward sloping $SRAS$. If the economy is hit by a positive supply shock

a. the quantity of real money balances will decrease, the real interest rate will increase, and the LM curve will shift to the right.

b. the quantity of real money balances will increase, the real interest rate will decrease, and the LM curve will shift to the right.

c. the quantity of real money balances will decrease, the real interest rate will increase, and the LM curve will shift to the left.

d. the quantity of real money balances will increase, the real interest rate will decrease, and the LM curve will shift to the left.

4. If the demand of real money balances becomes more sensitive to the level of income, the LM curve:

a. becomes steeper.

b. becomes flatter.

c. shifts inward.

d. shifts outward.

5. If the government raises taxes and the central bank increases the money supply, then the combined effect of these two policies would cause income to:

a. fall.

b. stay the same.

c. rise.

d. It cannot be determined from the information given.

6. According to the sticky price theory, the price level will increase when:

a. current output is greater than the full employment level, and the fraction of firms with sticky prices increases.

b. current output is smaller than the full employment level, and the fraction of firms with sticky prices decreases.

c. the current output level falls below the full employment level.

d. the expected price level increases.

7. Assume that the sticky price theory holds. If the fraction of firms with sticky prices is 0.8 and the price set by firms with flexible prices is $p_f = P + 0.5(Y - \overline{Y})$, then the supply curve for this economy is:

a. $Y = \overline{Y} + 0.5[P - E(P)]$

b. $Y = \overline{Y} + 0.8[P - E(P)]$

c. $Y = \overline{Y} + 2[P - E(P)]$

d. $Y = \overline{Y} + 8[P - E(P)]$

8. In the sticky-price model, if all firms have sticky prices (i.e. set their price in advance), then the short-run aggregate supply curve will be

a. horizontal.

b. upward-sloping.

c. downward-sloping.

d. vertical.

9. According to the imperfect information model of the $SRAS$, firms

a. can observe both the price of their output and the overall price level.

b. can observe the price of their output but cannot observe the overall price level.

c. cannot observe the price of their output but can observe the overall price level.

d. cannot observe either the price of their own output or the overall price level.

10. Consider the $AD - AS$ model of the economy where the $SRAS$ is: $Y = \overline{Y} + \alpha[P - E(P)]$, with $\alpha > 0$. If α decreases, then the $SRAS$ will become

a. horizontal.

b. vertical.

c. flatter.

d. steeper.

11. According to the Phillips curve model, the inflation rate π depends on all of the following except

a. the level of business inventories.

b. expected inflation.

c. cyclical unemployment.

d. supply shocks.

12. The inflation caused by supply shocks is called

a. expected inflation.

b. wage inflation.

c. demand-pull inflation.

d. cost-push inflation.

13. Assume that the following model of the Phillips curve holds in the real world: $\pi = E(\pi) - 0.25(u - u^n) + v$. In addition, assume that the central bank wants to use the Phillips curve to manage the level of inflation and unemployment in the economy. In this situation, what is the change in inflation that the central bank must be willing to accept in order to reduce cyclical unemployment by 1%?

a. An increase in inflation by 0.25%

b. An increase in inflation by 4%

c. A decrease in inflation by 4%

d. A decrease in inflation by 0.25%

14. The idea that, in the long run, the economy returns to the levels of output and unemployment described by the classical model is called

a. the sticky price model.

b. the natural-rate hypothesis.

c. the adaptive expectations assumption.

d. the imperfect information model.

Use the following information to answer questions $15 - 17$. Consider the following model of the Phillips curve: $\pi = E(\pi) - 0.2(u - u^n) + v$. Assume that a fraction γ of the agents form expectations rationally, while the rest form expectations according to an adaptive scheme. This implies that we can write $E(\pi) = (\gamma)\pi + (1 - \gamma)\pi_{-1}$, where π_{-1} is inflation in the previous period.

15. Given this definition of $E(\pi)$, how will inflation change when cyclical unemployment increases by 1%?

a. Inflation will decrease by 0.2%

b. Inflation will decrease by $0.2 \times (1 - \gamma)\%$

c. Inflation will decrease by $0.2/(1 - \gamma)\%$

d. Inflation will decrease by 5%

16. Given this definition of $E(\pi)$, what is the value of cost-push inflation if the economy is hit by a 1% adverse supply shock?

a. 0.2%

b. 1%

c. $(1-\gamma)\,\%$

d. $1/(1-\gamma)\,\%$

17. If $\gamma = 0.9$, what is the slope of the short run trade-off between inflation and unemployment?

a. -0.2

b. -2

c. -5

d. 5

18. Assume that the consumption function is $C = 20 + 0.7Y$. Which of the following statements about the marginal propensity to consume (MPC) and average propensity to consume (APC) is correct?

a. The MPC is always equal to 0.7, while the APC increases as the output level increases.

b. The MPC is always equal to 0.7 and the APC is always equal to 20.

c. The MPC is always equal to 0.7 and the APC is always equal to $(1 - 0.7)$.

d. The MPC is always equal to 0.7, while the APC depends on the level of output but is always larger than the MPC.

19. Which of the following statements about consumption is true?

a. In the Keynesian model, consumption depends on income and on the real interest rate.

b. In both the Keynesian model and the two-period intertemporal model, consumption depends on the real interest rate.

c. In the two-period intertemporal model, consumption depends on income and on the real interest rate.

d. In both the Keynesian model and the two-period intertemporal model, consumption is not affected by income.

20. If the annual interest rate is 10%, then \$1 of income today is equivalent to income next year of

a. \$0.9

b. \$0.91

c. \$1.1

d. \$2

21. In the two-period intertemporal consumption model, assume that the consumer will not earn any income in the second period, i.e. $Y_2 = 0$. What is the maximum amount of consumption that this consumer will be able to afford in the second period?

a. 0

b. Y_1

c. $Y_1(1 + r)$

d. $Y_1/(1 + r)$

22. In the two-period intertemporal consumption model, assume that the consumer has a borrowing constraint. What is the maximum amount of consumption that this consumer will be able to afford in the first period?

a. 0

b. Y_1

c. $Y_1(1+r)$

d. $Y_1/(1+r)$

23. In the two-period intertemporal consumption model, if $C_1 < Y_1$

a. the consumer will be borrowing in both the first and the second period.

b. the consumer will be borrowing in the first period and use the second period income to repay his loan.

c. the consumer will be saving in both the first and the second period.

d. the consumer will be saving in the first period and use the saved amount for consumption in the second period.

24. In the two-period intertemporal consumption model, the consumer's optimal allocation of consumption is given by

a. the point on the budget constraint that touches the lowest indifference curve.

b. any intersection of an indifference curve with the budget constraint.

c. the point that gives the highest total consumption over the two periods.

d. the point on the budget constraint that touches the highest indifference curve.

25. In a two-period consumption model in which the consumer is initially saving, a rise in the real interest rate would cause consumption in the first period to

a. rise because of the income effect.

b. fall because of the substitution effect.

c. remain constant because the income and substitution effects cancel each other.

d. be undetermined without more information about sizes of the income and substitution effects.

26. Suppose a consumer works for 40 years and then spends 25 years in retirement. The life-cycle hypothesis predicts that, during his working years, this consumer would

a. save all of his income.

b. save some fraction of his income.

c. spend all of his income.

d. spend all of his income and borrow for extra spending.

27. Friedman's permanent-income hypothesis asserts that the marginal propensity to consume out of income is

a. one.

b. zero.

c. higher for permanent income than it is for temporary income.

d. lower for permanent income than it is for temporary income.

28.According to the permanent-income hypothesis, people with higher average propensities to consume will most likely have

a. higher transitory income.

b. lower permanent income.

c. a lower ratio of permanent to transitory income.

d. a lower ratio of transitory to permanent income.

29. Countries whose central banks have adopted the policy objective of output stabilization

a. will implement expansionary policies when inflation rises above the desired value.

b. will implement contractionary policies when inflation rises above the desired value.

c. will implement contractionary policies when output falls below the full employment level.

d. will implement expansionary policies when output falls below the full employment level.

30. Which of the following is NOT a reason why a central bank should be careful when pursuing an active monetary policy?

a. The magnitude of the impact of a new policy on the AD is difficult to assess.

b. Future economic conditions might be difficult to forecast.

c. It is unclear whether an expansionary monetary policy will have a negative or positive effect on the AD.

d. It takes time for the central bank to respond to a shock to the economy, and it takes time for a new policy to have its effects on the economy.

31. If Ricardian equivalence holds and the government cuts taxes without any plans to reduce government spending, then a forward-looking consumer would

a. increase consumption by the same amount as the tax cut.

b. increase consumption by the tax cut times the marginal propensity to consume.

c. decrease consumption in order to save for future taxes.

d. leave consumption unchanged in order to save for future taxes.

32. Assume that Ricardian equivalence holds and that the government decreases taxes without any plans to reduce government spending. What happens to public saving and private saving?

a. Both public and private saving decrease.

b. Public saving decreases and private saving increases by the same amount.

c. Public saving decreases and private saving increases by a smaller amount.

d. Public saving decreases and private saving remains constant.

33. Most economists oppose a strict balanced-budget rule. Based on the following statements, which one of these economists is in support of this type of policy?

a. Economist 1: Countercyclical spending helps stabilize the economy.

b. Economist 2: Tax smoothing minimizes the distortion of incentives.

c. Economist 3: Deficits allow the intertemporal shifting of burdens.

d. Economist 4: Budget deficits might result in high real interest rates.

Longer questions

1. Consider the $AD-AS$ model built from the $IS-LM$, and assume that the economy is currently operating at the long run equilibrium A, with price level P_A and real interest rate r_A. The $SRAS$ has the following expression: $Y=\overline{Y}+\alpha\left[P-E\left(P\right)\right]$, where $E\left(P\right)$ is the expected price level, while α is a parameter satisfying: $0<\alpha<1$.

a. Draw a picture of the $AD-AS$ showing the long run equilibrium point A. What is the value of $E\left(P\right)$ in A? How does $E\left(P\right)$ compare to P at any $P>P_A$? How does $E\left(P\right)$ compare to P at any $P<P_A$?

b. Assume that the economy is hit by an unexpected preference shock in the form of an exogenous increase in the MPC. This shock moves the economy from the long run equilibrium point A to the short run equilibrium point B. Draw a picture of the $AD-AS$ showing this new short run equilibrium point. What is the impact of this preference shock on the real interest rate in the short run?

c. How does $E\left(P\right)$ compare to P in the short run equilibrium point B?

d. Assume that there is no policy intervention, and that the economy slowly moves to a new long run equilibrium point C. How will $E\left(P\right)$ change in the adjustment from point B to point C?

e. How will the real interest rate change in the adjustment from point B to point C?

2. Paul decides how to consume in the two periods of his life based on the intertemporal consumption model. Assume that Paul doesn't face any borrowing constraints.

a. If $MRS=C_2/(3C_1)$, $Y_1=64$, $Y_2=208$, $r=4\%$, will Paul be borrowing or saving in the first period?

b. Assume that r increases to 12%. Will Paul now be borrowing or saving in the first period?

c. Consider $\widetilde{Y}_2=208(1+0.12)/(1+0.04)=224$. Compute the optimal $\widetilde{C}_1$ given this new value for $\widetilde{Y}_2$, $MRS=C_2/(3C_1)$, $Y_1=64$, and $r=4\%$. The difference between $\widetilde{C}_1$ and the value of C_1 that you computed in point *a.* is the income effect. The difference between the value of C_1 that you computed in point *b.* and $\widetilde{C}_1$ is the substitution effect. Which one of the two effects dominates? Is this what you were expecting given your results from point *a.* and point *b.*?

d. Marie also decides how to consume in the two periods of her life based on the intertemporal consumption model. However, Marie has a borrowing constraint. Use the expression for the intertemporal budget constraint to show that if Maria's optimal choice implies that $C_2<Y_2$, then her borrowing constraint will be binding.

e. Because of her borrowing constraint, Maria is forced to consume $C_1\leq Y_1$. Is it possible that this consumption combination lies on a higher indifference curve than her optimal choice in the absence of a borrowing constraint? Explain.

3. Consider the AD/AS model built from the IS/LM, with an upward sloping $SRAS$. The economy was operating at full employment, but it is suddenly hit by unfavorable weather conditions, which increases the expected price level and shifts the $SRAS$ to the left.

a. Assume that the government decides to keep its policy unchanged.

i. What should the central bank of this country do if its main objective is output stabilization in the short run? Explain your answer.

ii. What are the effects of this policy on the price level, output, the real interest rate, consumption and investment? Explain your answer.

iii. Compare the long-run equilibrium after this policy is implemented with the long-run equilibrium that this country would have reached without policy intervention. Are the price level, output, real interest rate, consumption and investment different? Explain your answer.

b. Assume that the government decides to keep its policy unchanged.

i. What should the central bank of this country do if its main objective is to avoid price increases in the short and long run? Explain your answer.

ii. What are the effects of this policy on the price level, output, the real interest rate, consumption and investment? Explain your answer.

iii. Compare the long-run equilibrium after this policy is implemented with the long-run equilibrium that this country would have reached without policy intervention. Are the price level, output, real interest rate, consumption and investment different? Explain your answer.

4. Consider the AD/AS model built from the IS/LM, with an upward sloping $SRAS$. The economy was operating at full employment, but it is suddenly hit by a negative demand shock in the form of a decrease in planned investment at each level of the real interest rate.

a. Show the impact of the negative demand shock in the Keynesian cross diagram and in the IS/LM graph.

b. Show what will happen in the Keynesian cross diagram and in the IS/LM graph if the government decides to increase spending in order to contrast the negative demand shock. Assume that the increase in government spending successfully bring output back to the full employment level.

c. Compare the initial full employment equilibrium (before the negative demand shock) with the new long run equilibrium after the government policy intervention. Is the level of investment different? Is the level of consumption different? Explain your answer.

5. (Difficult question) In the two-period intertemporal consumption model, $MRS = C_2/(4C_1)$, $r = 2\%$, $Y_1 = 350$ and $Y_2 = 153$. Assume that this consumer does not have a borrowing constraint.

a. Use the MRS and the budget constraint to compute the optimal consumption combination for this consumer. Would your answer change if the consumer had a borrowing constraint? Explain your answer.

b. i. Use the optimality condition: $C_2/(4C_1) = (1 + r)$ and the budget constraint to construct a relationship between C_1 and Y_1, Y_2 in the form: $C_1 = \lambda_1 \left[Y_1 + \frac{Y_2}{(1+r)} \right]$. Find the value of the parameter λ_1.

ii. Find the value of ΔC_1 when $\Delta Y_1 = 1$ and $\Delta Y_2 = 0$, call this value MPC_{C_1,Y_1}.Find the value of ΔC_1 when $\Delta Y_1 = 0$ and $\Delta Y_2 = (1 + r)$, call this value MPC_{C_1,Y_2}. Is $MPC_{C_1,Y_1} = MPC_{C_1,Y_2}$? In other words, is the Marginal Propensity to Consume for consumption in the first period (C_1) different if the change in income happens in the first period (Y_1) or in the second period (Y_2)? Explain your answer.

c. i. Use the optimality condition: $C_2/(4C_1) = (1 + r)$ and the budget constraint to construct a relationship between C_2 and Y_1, Y_2 in the form: $C_2 = \lambda_2 \left[(1 + r) Y_1 + Y_2 \right]$. Find the value of the parameter λ_2.

ii. Find the value of ΔC_2 when $\Delta Y_1 = \frac{1}{(1+r)}$ and $\Delta Y_2 = 0$, call this value MPC_{C_2,Y_1}.Find the value of ΔC_2 when $\Delta Y_1 = 0$ and $\Delta Y_2 = 1$, call this value MPC_{C_2,Y_2}. Is $MPC_{C_2,Y_1} = MPC_{C_2,Y_2}$? In other words, is the Marginal Propensity to Consume for consumption in the second period (C_2) different if the change in income happens in the first period (Y_1) or in the second period (Y_2)? Explain your answer.

d. i. Use the budget constraint to construct a relationship between $C_T = C_1 + \frac{C_2}{(1+r)}$ and $Y_T = Y_1 + \frac{Y_2}{(1+r)}$ in the form: $C_T = \lambda_T Y_T$. Find the value of the parameter λ_T.
ii. Find the value of ΔC_T when $\Delta Y_T = 1$, call this value MPC_{C_T,Y_T}. Given your answer, what is the Marginal Propensity to Consume for total consumption (C_T) out of the total income for the two periods (Y_T)? Explain your answer.

6. In this question, you will investigate the impact on consumption of an increase in the investment demand in the IS/LM model and in the two-period consumption model. Assume that the country is a closed economy, and that the government implemented a series of incentives that increased the quantity of investment demanded at each level of the real interest rate. As a consequence, the equilibrium real interest rate in this country increased from 4% to 5%. Assume that there is no change in government spending, taxes, or monetary policy.

a. Consider the IS/LM model built from the Keynesian model.

i. Show how the change in the investment demand function will affect the IS/LM graph and the equilibrium of the model. You know that the equilibrium real interest rate will increase from 4% to 5%, but how will the equilibrium level of output change? Explain your answer.
ii. Recall that in the Keynesian model $C = MPC(Y - T)$. Then, how will consumption be affected by the change in the investment demand function? Explain your answer.
b. Consider now the two-period consumption model. Assume that $MRS = (4C_2)/C_1$, $Y_1 = 255$ and $Y_2 = 546$. Assume that this consumer does not have a borrowing constraint.

i. How will C_1 and C_2 be affected by the increase in the real interest rate from 4% to 5%? How will total consumption $C_T = C_1 + \frac{C_2}{(1+r)}$ be affected by the change in the real interest rate? Explain your answer. (Notice that when computing total consumption C_T, the value of C_2 discounted to the first period will also change because of the change in r).
ii. Would your answers to b.i. change if the consumer had a borrowing constraint? Explain your answer.

7. Consider the model of the Phillips Curve: $\pi = E(\pi) - \beta(u - u^n) + v$
Assume that $\beta = 0.2$ and $v = 0$. You know that $u^n = 4\%$, $\pi_{-1} = 2\%$ (inflation in the previous period), and $\pi_{-2} = 4\%$ (inflation two periods ago).
a. Assume that agents have adaptive expectations in the form: $E(\pi) = \pi_{-1}$
i. What inflation rate must policymakers be willing to accept if they want the unemployment rate to be 8%. Explain your answer.
ii. Assume that policymakers want to reduce the unemployment rate to 4%; according to the Phillips curve model, what change in the inflation rate should they implement? Explain your answer.
b. Assume that agents have adaptive expectations in the form: $E(\pi) = 0.5\pi_{-1} + 0.5\pi_{-2}$
i. What inflation rate must policymakers be willing to accept if they want the unemployment rate to be 8%. Explain your answer.
ii. Assume that policymakers want to reduce the unemployment rate to 4%; according to the Phillips curve model, what change in the inflation rate should they implement? Explain your answer.
c. Assume that agents have expectations in the form: $E(\pi) = 0.2\pi + 0.8\pi_{-1}$. Notice that in this case a portion of the expectations is correct, i.e. it is equal to the actual value of π. (Hint: be careful here, you will need to solve the model for π)
i. What inflation rate must policymakers be willing to accept if they want the unemployment rate to be 8%. Explain your answer.
ii. Assume that policymakers want to reduce the unemployment rate to 4%; according to the Phillips curve model, what change in the inflation rate should they implement? Explain your answer.

Answers

1. d	11. a	21. c	31. d
2. c	12. d	22. b	32. b
3. b	13. a	23. d	33. d
4. a	14. b	24. d	
5. d	15. c	25. d	
6. d	16. d	26. b	
7. d	17. b	27. c	
8. a	18. d	28. d	
9. b	19. c	29. d	
10. d	20. c	30. c	

Longer questions

1.

a. At point A, $E(P) = P$; at any $P > P_A$ we have that $E(P) < P$; while at any $P < P_A$ we have that $E(P) > P$.

b. The AD will shift to the right, so point B will have higher Y and higher P relative to the original long run equilibrium A. The IS curve will shift to the right, so in the short run the real interest rate will be higher.

c. At the short run equilibrium point B, $Y > \overline{Y}$ so $E(P) < P$.

d. $E(P)$ will increase until $E(P) = P$ in the new long run equilibrium point C.

e. In the $IS - LM$ model, the adjustment to the long run equilibrium happens through shifts of the LM curve to the left. Thus, the real interest rate will increase in the adjustment from the short run equilibrium point B to the new long run equilibrium point C.

2.

a. $C_1 = 66 > Y_1 = 64$, so Paul will be borrowing in the first period.

b. Now $C_1 = 62.43 < Y_1 = 64$, so Paul will be saving in the first period.

c. $\widetilde{C}_1 = 69.85$. So, the income effect is $69.85 - 66 = 3.85$, while the substitution effect is $62.43 - 69.85 = -7.42$. The substitution effect dominates (we already knew this, because we obtained that C_1 decreases as a consequence of the increase in the real interest rate).

d. We know that $C_2 = Y_2 + (Y_1 - C_1)(1 + r)$, so if $C_2 < Y_2$, then it means that $(Y_1 - C_1) < 0$, which implies that Maria would like to borrow in the first period and consume $C_1 > Y_1$.

e. No, any consumption combination with $C_1 \leq Y_1$ will lie on a lower indifference curve than the optimal consumption combination in the absence of a borrowing constraint. This is because the option of setting $C_1 \leq Y_1$ is available also when the borrowing constraint is in place, so if Maria is not choosing to consume $C_1 \leq Y_1$ it must be because this choice gives her a lower utility (i.e. lies on a lower indifference curve).

3.

a.

i. The central bank in this case should increase the money supply, which will shift the LM curve and the AD curve to the right.

ii. The expansionary monetary policy will increase the price level and output (and thus increase consumption because of the increase in output), and decrease the real interest rate (and thus increase investment).

iii. The long-run equilibrium with the policy intervention will have a higher price level, same output, same consumption, same real interest rate, and same investment.

b.

i. The central bank in this case should decrease the money supply, which will shift the LM curve and the AD curve to the left.

ii. The contractionary monetary policy will decrease the price level and output (and thus decrease consumption because of the increase in output), and increase the real interest rate (and thus decrease investment).

iii. The long-run equilibrium with the policy intervention will have a lower price level, same output, same consumption, same real interest rate, and same investment.

4.

a. In the Keynesian cross diagram, the PE line will shift down and the equilibrium level of output will be lower at each level of the real interest rate. Thus, in the IS/LM graph the IS curve will be more shifted to the left.

b. In the Keynesian cross diagram, the PE line will shift up and the equilibrium level of output will increase. In the IS/LM graph, the IS curve will shift to the right.

c. The real interest rate will be the same as in the original long-run equilibrium, but because of the change in the investment function, the level of investment will be the lower. Consumption will be the same because output is the same.

5.

a. $C_2/(4C_1) = (1+r)$ so we have: $C_2 = (1+r)4C_1$
The budget constraint is: $C_1 + \frac{C_2}{(1+r)} = Y_1 + \frac{Y_2}{(1+r)}$
so we get: $5C_1 = Y_1 + \frac{Y_2}{(1+r)} = 350 + \frac{153}{(1+0.02)} = 500$, and finally $C_1 = \frac{500}{5} = 100$.
For C_2 we have: $C_2 = (1+r)4C_1 = (1.02)400 = 408$
Since $C_1 < Y_1$, the answer would be the same even if the consumer had a borrowing constraint.

b. i. $C_2 = (1+r)4C_1$, so we can re-write the budget constraint as $C_1 + \frac{(1+r)4C_1}{(1+r)} = Y_1 + \frac{Y_2}{(1+r)}$, which gives: $5C_1 = \left[Y_1 + \frac{Y_2}{(1+r)}\right]$ or $C_1 = \frac{1}{5}\left[Y_1 + \frac{Y_2}{(1+r)}\right]$. Thus, $\lambda_1 = \frac{1}{5}$.

ii. Given that $C_1 = \frac{1}{5}\left[Y_1 + \frac{Y_2}{(1+r)}\right]$, we have that $\Delta C_1 = \frac{1}{5}\left[\Delta Y_1 + \frac{\Delta Y_2}{(1+r)}\right]$
Then $\Delta C_1 = \frac{1}{5}$ when $\Delta Y_1 = 1$ and $\Delta Y_2 = 0$, so $MPC_{C_1,Y_1} = \frac{1}{5}$. And, $\Delta C_1 = \frac{1}{5}$ when $\Delta Y_1 = 0$ and $\Delta Y_2 = (1+r)$, so $MPC_{C_1,Y_2} = \frac{1}{5}$.
So yes, $MPC_{C_1,Y_1} = MPC_{C_1,Y_2}$. The Marginal Propensity to Consume for consumption in the first period (C_1) is the same if the change in income happens in the first period (Y_1) or in the second period (Y_2).

c. i. We can write the budget constraint as $C_1(1+r) + C_2 = Y_1(1+r) + Y_2$, and use the optimality condition $C_2 = (1+r)4C_1$ to write $\frac{C_2}{4} = (1+r)C_1$ and
$\frac{C_2}{4} + C_2 = Y_1(1+r) + Y_2$ which gives: $\frac{5}{4}C_2 = [(1+r)Y_1 + Y_2]$ or $C_2 = \frac{4}{5}[(1+r)Y_1 + Y_2]$. Thus, $\lambda_2 = \frac{4}{5}$.

ii. Given that $C_2 = \frac{4}{5}[(1+r)Y_1 + Y_2]$, we have that $\Delta C_2 = \frac{4}{5}[(1+r)\Delta Y_1 + \Delta Y_2]$

Then $\Delta C_2 = \frac{4}{5}$ when $\Delta Y_1 = \frac{1}{(1+r)}$ and $\Delta Y_2 = 0$, so $MPC_{C_2,Y_1} = \frac{4}{5}$. And, $\Delta C_2 = \frac{4}{5}$ when $\Delta Y_1 = 0$ and $\Delta Y_2 = 1$, so $MPC_{C_2,Y_2} = \frac{4}{5}$.
So yes, $MPC_{C_2,Y_1} = MPC_{C_2,Y_2}$. The Marginal Propensity to Consume for consumption in the second period (C_2) is the same if the change in income happens in the first period (Y_1) or in the second period (Y_2).

d. i. The budget constraint is $C_1 + \frac{C_2}{(1+r)} = Y_1 + \frac{Y_2}{(1+r)}$, so $C_T = Y_T$ and $\lambda_T = 1$.

ii. $\Delta C_T = 1$ when $\Delta Y_T = 1$, so $MPC_{C_T,Y_T} = 1$. In this model, the consumer will always consume his/her total income across the two periods, so any changes in Y_T will cause an equal change in C_T.

6.

a. i. If the quantity of investment demanded at each level of the real interest rate increases, the planned expenditure line in the Keynesian cross diagram will increase, and the IS curve will shift to the right. Thus, the equilibrium level of output will increase together with the equilibrium real interest rate.

ii. Since the level of Y will increase and taxes T are unchanged, consumption C will increase as a consequence of the change in the investment demand function.

b. i. We need to use $(4C_2)/C_1 = (1+r)$ and $C_1 + \frac{C_2}{(1+r)} = Y_1 + \frac{Y_2}{(1+r)}$, which gives $C_2 = \frac{1}{4}(1+r)C_1$ and thus $C_1 + \frac{1}{4}C_1 = Y_1 + \frac{Y_2}{(1+r)}$. Plugging in the values of income we get: $C_1 = \frac{4}{5}\left[255 + \frac{546}{(1+r)}\right]$.

For $r = 0.04$ we get: $C_1 = \frac{4}{5}\left[255 + \frac{546}{(1+0.04)}\right] = 624$ and $C_2 = \frac{1}{4}(1+0.04)C_1 = 162.24$

For $r = 0.05$ we get: $C_1 = \frac{4}{5}\left[255 + \frac{546}{(1+0.05)}\right] = 620$ and $C_2 = \frac{1}{4}(1+0.05)C_1 = 162.75$

Total consumption will be: $C_T = C_1 + \frac{C_2}{(1+0.04)} = 624 + \frac{162.24}{(1+0.04)} = 780$ and $C_T = C_1 + \frac{C_2}{(1+0.05)} = 620 + \frac{162.75}{(1+0.05)} = 775$. Thus, C_T will decrease as a consequence of the increase in the real interest rate.

ii. The borrowing constraint si binding for both $r = 0.04$ and $r = 0.05$, so in both cases the optimal consumption combination will be: $C_1 = 255$ and $C_2 = 546$. Total consumption will be: $C_T = 225 + \frac{546}{(1+0.04)} = 750$ and $C_T = 225 + \frac{546}{(1+0.05)} = 745$

7.

a. In this case the Phillips curve becomes: $\pi = \pi_{-1} - \beta(u - u^n) + v$, and given the values that we have: $\pi = 2 - 0.2(u - 4)$

If policymakers want the unemployment rate to be 8%, they need to accept a value of the inflation rate equal to $\pi = 2 - 0.2(8 - 4) = 1.2\%$

If policymakers want to reduce the unemployment rate to 4%, they need to change the inflation rate to $\pi = 2 - 0.2(4 - 4) = 2\%$

b. In this case the Phillips curve becomes: $\pi = 0.5\pi_{-1} + 0.5\pi_{-2} - \beta(u - u^n) + v$, and given the values that we have: $\pi = 0.5(2) + 0.5(4) - 0.2(u - 4) = 3 - 0.2(u - 4)$

If policymakers want the unemployment rate to be 8%, they need to accept a value of the inflation rate equal to $\pi = 3 - 0.2(8 - 4) = 2.2\%$

If policymakers want to reduce the unemployment rate to 4%, they need to change the inflation rate to $\pi = 3 - 0.2(4 - 4) = 3\%$

c. In this case the Phillips curve becomes: $\pi = 0.2\pi + 0.8\pi_{-1} - \beta(u - u^n) + v$, and given the values that we have: $(1 - 0.2)\pi = 0.8(2) - 0.2(u - 4)$ which gives: $\pi = 2 - 0.25(u - 4)$

If policymakers want the unemployment rate to be 8%, they need to accept a value of the inflation rate equal to $\pi = 2 - 0.25(8 - 4) = 1\%$

If policymakers want to reduce the unemployment rate to 4%, they need to change the inflation rate to $\pi = 2 - 0.25(4 - 4) = 2\%$