Solutions to HW #4:

1. D
2. A
3. C
4. B
5. D
6. D
7. B
8. B
9. B
10. A
11. C
12. A
13. C
14. C
15. C
16. B
17. B
18. C
19. A
20. A
21. D
22. A
23. C
24. A
25. A

(B) Essay Questions

1. Chapter 10, question 3:

a. When taxes do not depend on income, a one-dollar increase in income means that disposable income increases by one dollar. Consumption increases by the marginal propensity to consume *MPC*. When taxes do depend on income, a one-dollar increase in income means that disposable income increases by only (1-t) dollars. Consumption increase by the product of the *MPC* and the change in disposable income, or (1-t) *MPC*, this is less than the. The key point is that disposable income changes by less than total income, so the effect on consumption is smaller.

b. When taxes are fixed, we know that the multiplier is: $\Delta Y/\Delta G=1/(1-MPC)$.

When taxes depend on income, we know that the increase of ΔG increases total income by ΔG; disposable income, however, increases by only $(1-t)\Delta G$ --less than dollar for dollar. Consumption then increases by an amount $(1-t)MPC^{*}\Delta G$. Expenditure and income increase by this amount, which in turn causes consumption to increase even more. The process continues, and the total change in output is:

$$\Delta Y = \Delta G\left\{1 + (1-t)MPC + \left[(1-t)MPC\right]^2 + \left[(1-t)MPC\right]^3 + \cdots\right\}$$
$$= \frac{\Delta G}{1-(1-t)MPC}$$

Thus the government purchases multiplier becomes 1/(1-(1-*t*)*MPC*) rather than 1/(1-*MPC*). This means a much smaller multiplier. For example, if the marginal propensity to consume *MPC* is ¾ and the tax rate *t* is 1/3, then the multiplier falls from 1/(1-3/4), or 4, to 1/(1-(1-1/3)(3/4)), or 2.

c. In this chapter, we derived the IS curve algebraically and used it to gain insight into the relationship between the interest rate and output. To determine how this tax system alters the slope of the IS curve, we can derive the IS curve for the case in which taxes depend on income. Begin with the national income accounts identity:

$$Y = C + I + G$$

The consumption function is:

$$C = a + b\left(Y - \overline{T} - tY\right)$$

Note that in this consumption function taxes are a function of income. The investment function is the same as in the chapter:

$$I = c - d\,r$$

Substitute the consumption and investment functions into the national income accounts identity to obtain:

$$Y = \left(a + b\left(Y - \overline{T} - tY\right)\right) + c - dr + G$$

Solving for Y:

$$Y = \frac{a+c}{1-b(1-t)} + \frac{G}{1-b(1-t} - \frac{b\overline{T}}{1-b(1-t)} - \frac{dr}{1-b(1-t)}$$

This IS equation is analogous to the one derived in the text except that each term is divided by 1-b(1-t) rather than by (1-*b*). We know that *t* is a tax rate, which is less than 1. Therefore, we conclude that this IS curve is steeper than the one in which taxes are a fixed amount.

2. Chapter 11, question 3:

a. Y = C(Y-T) +I(r) + G

Plugging in the consumption function and the investment function, we get the IS equation:

Y = 1700 – 100 r.

b. LM equation: Y = 500 + 100 r

c. From the IS and LM equations, we obtain: r = 6, Y= 1100.

d. The IS equation becomes: $Y = 1900 – 100 r$.
   The IS curve shifts to the right by 200.
   The new equilibrium is: $r = 7$, $Y = 1200$.

e. The LM equation becomes: $Y = 600 + 100 r$
   The LM curve shifts to the right by 100.
   The new equilibrium is: $r = 5.5$, $Y = 1150$.

f. The LM equation becomes: $Y = 2500 + 100 r$

   The LM curve shifts to the left by 250.
   The new equilibrium is: $r = 7.25$, $Y = 975$.

g. To derive the AD curve, we want to solve the IS and the LM equations for Y as a function of P. We obtain: $Y = 850 + 500/P$.

For the fiscal policy of part (d): $Y = 950 + 500/P$

The increase in government purchases by 50 shifts the AD curve to the right by 100.

For the monetary policy of part (e): $Y = 850 + 600/P$.

The increase in the money supply shifts the aggregate demand curve to the right.