1. Consider first the goods market model with constant investment (like in Keynes model at previous lesson). Consumption is given by:

$$C = c_0 + c_1(Y - T),$$

and I, G and T are given.

   a. Solve for equilibrium output. What is the value of the multiplier for a change in autonomous spending?

Now let investment depend on both sales and the interest rate:

$$I = b0 + b1Y - b2*i$$

   b. Solve for equilibrium output using the methods learned previously. Why is the effect of a change in autonomous spending bigger than what it was in part (a) at a given interest rate? Why? (Assume c1 + b1 6 1.)
   c. Suppose the central bank chooses an interest rate of $\bar{\imath}$. Solve for equilibrium output at that interest rate.
   d. Draw the equilibrium of this economy using an IS-LM diagram.

2. Analyze the response of the economy to fiscal policy:
   a. Use an IS-LM diagram to show the effects on output of a decrease in government spending. Can you tell what happens to investment? Why?

Now consider the following – model:

$$C = c_0 + c_1(Y - T)$$
$$I = b_0 + b_1Y - b_2i$$
$$Z = C + I + G$$
$$i = \bar{\imath}$$

   b. Solve for equilibrium output when the interest rate is i. Assume $c_1 + b_1 < 1$.
   c. Solve for the equilibrium level of investment.
   d. Let's go behind the scenes in the money market. Use the equilibrium in the money market

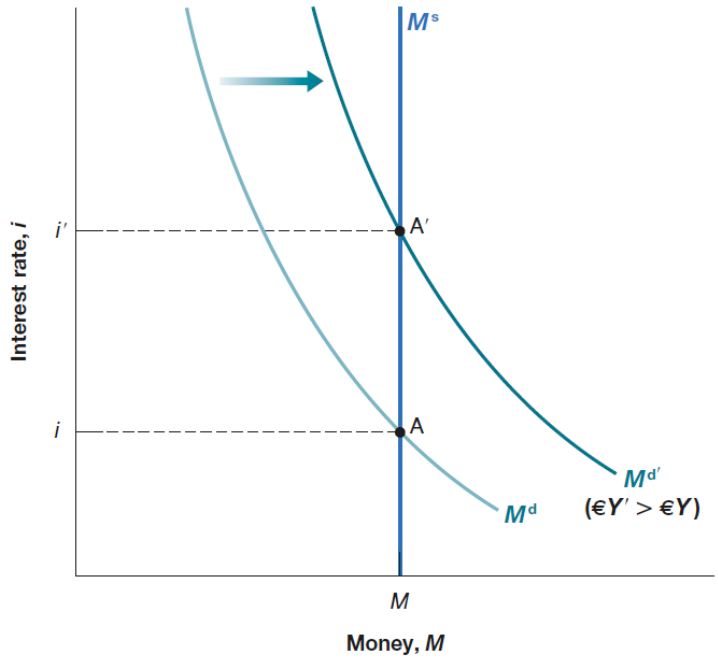
$$M/P = d_1Y - d_2i$$

To solve the equilibrium level of the real money supply when i = i. How does the real money supply vary with government spending?

3. Consider the money market to understand better the horizontal LM curve. The money market relation is:

$$M/P = YL(i).$$

   a. What is on the left-hand side of the above equation?
   b. What is on the right-hand side of the above equation?
   c. Using the figure below, try to answer how is the function L(i) represented in that figure?



d. You need to modify the figure above to represent the equation from the beginning of problem 3 in two ways. How does the horizontal axis have to be relabelled?
What is the variable that now shifts the money demand function? Draw a modified Figure with the appropriate labels.

e. Use your modified Figure to show that (i) as output rises, to keep the interest rate constant, the central bank must increase the real money supply; (ii) as output falls, to keep the interest rate constant, the central bank must decrease the real money supply.

4. Consider the following numerical example of the IS–LM model:

$$C = 200 + 0.25YD$$
$$I = 150 + 0.25Y - 1{,}000i$$
$$G = 250$$
$$T = 200$$
$$\bar{\imath} = 0.05$$

a. Derive the IS relation. (Hint: You want an equation with Y on the left side and everything else on the right.)

b. The central bank sets an interest rate of 5%. How is that decision represented in the equations?

c. What is the level of the real money supply when the interest rate is 5%? Use the expression:

$$M/P = 2Y - 8{,}000i$$

d. Solve for the equilibrium values of C and I, and verify the value you obtained for Y by adding C, I and G.

e. Now, suppose that the central bank cuts the interest rate to 3%. How does this change the LM curve? Solve for Y, I and C, and describe the effects of an expansionary monetary policy. What is the new equilibrium value of M/P supply?

f. Return to the initial situation in which the interest rate set by the central bank is 5%. Now suppose that government spending increases to G = 400. Summarise the effects of an expansionary fiscal policy on Y, I and C. What is the impact of the expansionary fiscal policy on the real money supply?

5. If a firm considers using its own funds (rather than borrowing) to finance investment projects, will higher interest rates discourage the firm from undertaking these projects? Explain. (Hint: Think of yourself as the owner of a firm that has earned profits and imagines that you will use the profits to finance new investment projects or buy bonds. Will your decision to invest in new projects in your firm be affected by the interest rate?)

6. In 2001, the Fed pursued an expansionary monetary policy and reduced interest rates. At the same time, President George W. Bush pushed through legislation that lowered income taxes.
    a. Illustrate the effect of such a policy mix on output.
    b. What happened to output in 2001? How do you reconcile that both fiscal and monetary policies were expansionary with the fact that growth was so low in 2002? (Hint: What else happened?).

7. What policy mix of monetary and fiscal policy is needed to meet the objectives given here?
    a. Increase Y while keeping Qi constant. Would investment (I) change?
    b. Decrease a fiscal deficit while keeping Y constant. Why must I also change?

ADDITIONAL QUESTIONS:

Label each of the following statements true, false or uncertain. Explain briefly.

1. The main determinants of investment are the level of sales and the interest rate.
2. If all the exogenous variables in the IS relation are constant, then a higher output level can be achieved only by lowering the interest rate.
3. The IS curve is downward sloping because goods market equilibrium implies that an increase in taxes leads to a lower output level.
4. If government spending and taxes increase by the same amount, the IS curve does not shift.
5. The LM curve is horizontal at the central bank's policy choice of the interest rate.
6. The real money supply is constant along the LM curve.
7. If the nominal money supply is:400 billion and the price level rises from an index value of 100 to an index value of 103, the real money supply increases.
8. If the nominal money supply rises from:400 billion to:440 billion and the price level increases from an index value of 100 to 102, the real money supply increases.
9. Increased government spending leads to decreased investment in the IS-LM model.