1. a. The invention of the new high-speed chip increases investment demand, which shifts the IS curve out. That is, at every interest rate, firms want to invest more. The increase in the demand for investment goods shifts the IS curve out, raising income and employment. Figure 11–8 shows the effect graphically.

![Graph showing IS and LM curves]

The increase in income from the higher investment demand also raises interest rates. This happens because the higher income raises demand for money; since the supply of money does not change, the interest rate must rise in order to restore equilibrium in the money market. The rise in interest rates partially offsets the increase in investment demand, so that output does not rise by the full amount of the rightward shift in the IS curve. Overall, income, interest rates, consumption, and investment all rise.

b. The increased demand for cash shifts the LM curve up. This happens because at any given level of income and money supply, the interest rate necessary to equilibrate the money market is higher. Figure 11–9 shows the effect of this LM shift graphically. The upward shift in the LM curve lowers income and raises the interest rate. Consumption falls because income falls, and investment falls because the interest rate rises.
c. At any given level of income, consumers now wish to save more and consume less. Because of this downward shift in the consumption function, the IS curve shifts inward. Figure 11–10 shows the effect of this IS shift graphically. Income, interest rates, and consumption all fall, while investment rises. Income falls because at every level of the interest rate, planned expenditure falls. The interest rate falls because the fall in income reduces demand for money; since the supply of money is unchanged, the interest rate must fall to restore money-market equilibrium. Consumption falls both because of the shift in the consumption function and because income falls. Investment rises because of the lower interest rates and partially offsets the effect on output of the fall in consumption.

2.

a. The IS curve is given by: \( Y = C(Y - T) + I(r) + G \).

We can plug in the consumption and investment functions and values for \( G \) and \( T \) as given in the
question and then rearrange to solve for the IS curve for this economy:

\[ Y = 200 + 0.75(Y - 100) + 200 - 25r + 100 \]
\[ Y - 0.75Y = 425 - 25r \]
\[ (1 - 0.75)Y = 425 - 25r \]
\[ Y = (1/0.25) (425 - 25r) \]
\[ Y = 1,700 - 100r. \]

This IS equation is graphed in Figure 11–11 for \( r \) ranging from 0 to 8.

b. The LM curve is determined by equating the demand for and supply of real money balances. The supply of real balances is \( 1,000/2 = 500 \). Setting this equal to money demand, we find:
\[ 500 = Y - 100r. \]
\[ Y = 500 + 100r. \]

This LM curve is graphed in Figure 11–11 for \( r \) ranging from 0 to 8.

c. If we take the price level as given, then the IS and the LM equations give us two equations in two unknowns, \( Y \) and \( r \). We found the following equations in parts (a) and (b):

IS: \( Y = 1,700 - 100r. \)
LM: \( Y = 500 + 100r. \)

Equating these, we can solve for \( r \):
\[ 1,700 - 100r = 500 + 100r \]
\[ 1,200 = 200r \]
\[ r = 6. \]

Now that we know \( r \), we can solve for \( Y \) by substituting it into either the IS or the LM equation. We find \( Y = 1,100 \).
Therefore, the equilibrium interest rate is 6 percent and the equilibrium level of output is 1,100, as depicted in Figure 11–11.
d. If government purchases increase from 100 to 150, then the IS equation becomes:

\[ Y = 200 + 0.75(Y - 100) + 200 - 25r + 150. \]

Simplifying, we find:

\[ Y = 1900 - 100r. \]

This IS curve is graphed as IS2 in Figure 11–12. We see that the IS curve shifts to the right by 200.

By equating the new IS curve with the LM curve derived in part (b), we can solve for the new equilibrium interest rate:

1,900 – 100r = 500 + 100r

1,400 = 200r

7 = r

We can now substitute r into either the IS or the LM equation to find the new level of output. We find \( Y = 1,200. \)

Therefore, the increase in government purchases causes the equilibrium interest rate to rise from 6 percent to 7 percent, while output increases from 1,100 to 1,200. This is depicted in Figure 11–12.

e. If the money supply increases from 1,000 to 1,200, then the LM equation becomes: \( (1,200/2) = Y - 100r, \) or \( Y = 600 + 100r. \)

This LM curve is graphed as LM2 in Figure 11–13. We see that the LM curve shifts to the right by 100 because of the increase in real money balances.
To determine the new equilibrium interest rate and level of output, equate the IS curve from part (a) with the new LM curve derived above:

\[ 1,700 - 100r = 600 + 100r \]
\[ 1,100 = 200r \]
\[ 5.5 = r. \]

Substituting this into either the IS or the LM equation, we find \( Y = 1,150 \).

Therefore, the increase in the money supply causes the interest rate to fall from 6 percent to 5.5 percent, while output increases from 1,100 to 1,150. This is depicted in Figure 11–13.

f. If the price level rises from 2 to 4, then real money balances fall from 500 to \( 1,000/4 = 250 \). The LM equation becomes: \( Y = 250 + 100r \).

As shown in Figure 11–14, the LM curve shifts to the left by 250 because the increase in the price level reduces real money balances.

To determine the new equilibrium interest rate, equate the IS curve from part (a) with the new LM curve from above:

\[ 1,700 - 100r = 250 + 100r \]
\[ 1,450 = 200r \]
\[ 7.25 = r. \]

Substituting this interest rate into either the IS or the LM equation, we find \( Y = 975 \). Therefore, the new equilibrium interest rate is 7.25, and the new equilibrium level of output is 975, as depicted in Figure 11–14.

g. The aggregate demand curve is a relationship between the price level and the level of income. To derive the aggregate demand curve, we want to solve the IS and the LM equations for \( Y \) as a function of \( P \). That is, we want to substitute out for the interest rate. We can do this by solving the IS and the LM equations for the interest rate:

IS: \( Y = 1,700 - 100r \)
\[ 100r = 1,700 - Y. \]
LM: \( (M/P) = Y - 100r \)
\[ 100r = Y - (M/P). \]

Combining these two equations, we find
\[ 1,700 - Y = Y - (M/P) \]
\[ 2Y = 1,700 + M/P \]
Y = 850 + M/2P.
Since the nominal money supply M equals 1,000, this becomes
Y = 850 + 500/P.
This aggregate demand equation is graphed in Figure 11–15.

How does the increase in fiscal policy of part (d) affect the aggregate demand curve? We can see this by deriving the aggregate demand curve using the IS equation from part (d) and the LM curve from part (b):

\[ IS: \ Y = 1,900 - 100r \]
100r = 1,900 – Y.

\[ LM: \ (1,000/P) = Y - 100r \]
100r = Y – (1,000/P).
Combining and solving for Y:
1,900 – Y = Y – (1,000/P),
Or Y = 950 + 500/P.
By comparing this new aggregate demand equation to the one previously derived, we can see that the increase in government purchases by 50 shifts the aggregate demand curve to the right by 100.

How does the increase in the money supply of part (e) affect the aggregate demand curve? Because the AD curve is Y = 850 + M/2P, the increase in the money supply from 1,000 to 1,200 causes it to become Y = 850 + 600/P.
By comparing this new aggregate demand curve to the one originally derived, we see that the increase in the money supply shifts the aggregate demand curve to the right.

3. To raise investment while keeping output constant, the government should adopt a loose monetary policy and a tight fiscal policy, as shown in Figure 11–20. In the new equilibrium at point B, the interest rate is lower, so that investment is higher. The tight fiscal policy—reducing government purchases, for example—offsets the effect of this increase in investment on output.
The policy mix in the early 1980s did exactly the opposite. Fiscal policy was expansionary, while monetary policy was contractionary. Such a policy mix shifts the IS curve to the right and the LM curve to the left, as in Figure 11–21. The real interest rate rises and investment falls.