SOLUTIONS TO TEXT PROBLEMS:

Quick Quizzes

1. When the government of a country increases the growth rate of the money supply from 5 percent per year to 50 percent per year, prices and nominal interest rates will increase dramatically. The government may be increasing the money supply to finance its expenditures.

2. Six costs of inflation are: (1) shoeleather costs; (2) menu costs; (3) relative-price variability and the misallocation of resources; (4) inflation-induced tax distortions; (5) confusion and inconvenience; and (6) arbitrary redistributions of wealth. Shoeleather costs arise because inflation causes people to spend resources going to the bank more often. Menu costs occur when people spend resources changing their posted prices. Relative-price variability occurs because as general prices rise, a fixed dollar price translates into a declining relative price, so the relative prices of goods are constantly changing as a result of inflation; this causes a misallocation of resources. The combination of inflation and taxation causes distortions because people are taxed on their nominal capital gains and interest income, instead of their real income. Inflation causes confusion and inconvenience because it reduces money's ability to function as a unit of account. Unexpected inflation redistributes wealth between borrowers and lenders.

Questions for Review

1. An increase in the price level reduces the real value of money because each dollar in your wallet now buys a smaller quantity of goods and services.

2. According to the quantity theory of money, an increase in the quantity of money causes a proportional increase in the price level.

3. Nominal variables are those measured in monetary units, while real variables are those measured in physical units. Examples of nominal variables include the prices of goods, wages, and the dollar value of GDP. Examples of real variables include relative prices (the price of one good in terms of another), real wages, and real GDP. According to the principle of monetary neutrality, only nominal variables are affected by changes in the quantity of money.

4. Inflation is like a tax because everyone who holds money loses purchasing power. In a hyperinflation, the government increases the money supply rapidly, which leads to a high rate of inflation. Thus the government uses the inflation tax, instead of taxes on income, to finance its spending.

5. According to the Fisher effect, an increase in the inflation rate raises the nominal interest rate by the same amount that the inflation rate increases, with no effect on the real interest rate.

6. The costs of inflation include shoeleather costs associated with reduced money holdings, menu costs associated with more frequent adjustment of prices, increased variability of relative prices, unintended changes in tax liabilities due to non-indexation of the tax code, confusion and inconvenience resulting from a changing unit of account, and arbitrary redistributions of wealth between debtors and creditors. With a low and stable rate of inflation like that in the United States, none of these costs are very high. Perhaps the most important one is the interaction between inflation and the tax code, which may reduce saving and investment even though the inflation rate is low.

7. If inflation is less than expected, creditors benefit and debtors lose. Creditors receive dollar payments from debtors that have a higher real value than was expected.

Problems and Applications

1. In this problem, all amounts are shown in billions.

   a. Nominal GDP = P x Y = \$10,000 and Y = real GDP = \$5,000, so $P = (P \times Y)/Y$ = \$10,000/\$5,000 = 2.

   Since $M \times V = P \times Y$, then $V = (P \times Y)/M$ = \$10,000/\$500 = 20.

   b. If M and V are unchanged and Y rises by 5 percent, then since $M \times V = P \times Y$, P must fall by 5 percent. As a result, nominal GDP is unchanged.

   c. To keep the price level stable, the Fed must increase the money supply by 5 percent, matching the increase in real GDP. Then, since velocity is unchanged, the price level will be stable.

   d. If the Fed wants inflation to be 10 percent, it will need to increase the money supply 15 percent. Thus M x V will rise 15 percent, causing P x Y to rise 15 percent, with a 10 percent increase in prices and a 5 percent rise in real GDP.

2. a. If people need to hold less cash, the demand for money shifts to the left, since there will be less money demanded at any price level.

   b. If the Fed does not respond to this event, the shift to the left of the demand for money combined with no change in the supply of money leads to a decline in the value of money (1/P), which means the price level rises, as shown in Figure 1.

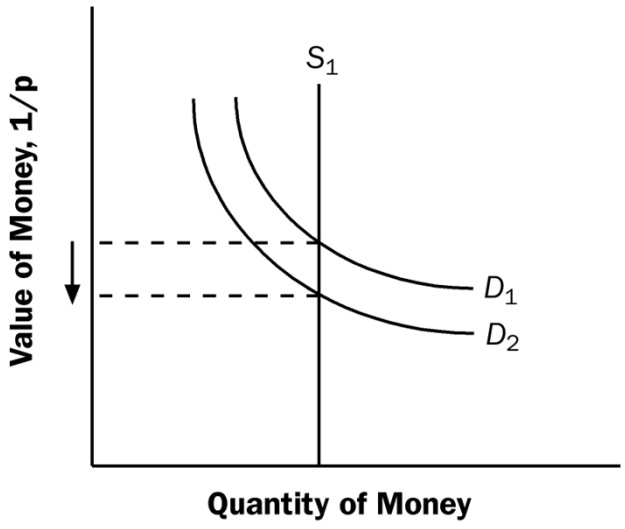

Figure 1

c. If the Fed wants to keep the price level stable, it should reduce the money supply from S_1 to S_2 in Figure 2. This would cause the supply of money to shift to the left by the same amount that the demand for money shifted, resulting in no change in the value of money and the price level.

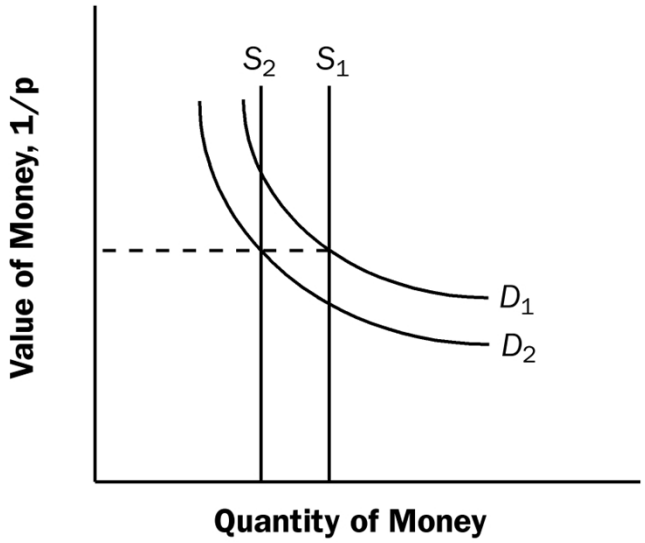

Figure 2

3. With constant velocity, reducing the inflation rate to zero would require the money growth rate to equal the growth rate of output, according to the quantity theory of money (M x V = P x Y).

4. Lenin is right that governments can confiscate the wealth of citizens with inflation. Inflation acts like a tax on people who hold money, by reducing its value. The government can finance its expenditures by printing money and using it to buy things, which results in a higher money supply and inflation. The result is a transfer of wealth from money-holders to the government.

5. If a country's inflation rate increases sharply, the inflation tax on holders of money increases significantly. Wealth in savings accounts is not subject to a change in the inflation tax because the nominal interest rate will increase with the rise in inflation. But holders of savings accounts are hurt by the increase in the inflation rate because they are taxed on their nominal interest income, so their real returns are lower.

6. Hyperinflations usually arise when governments try to finance much of their expenditures by printing money. This is unlikely to occur if the central bank (which is responsible for controlling the level of the money supply) is independent of the government.

7. a. When the price of both goods doubles in a year, inflation is 100 percent. The total cost of purchasing equal amounts of beans and rice equals the quantity of each good times its price, added together for all goods. That is, if x is the quantity of beans, which also equals the quantity of rice, then the cost of beans and rice for the year is $x(P_B + P_R)$. In the second year, the cost is $x(P_B' + P_R')$, where the ' mark refers to the price in the second year. Then we can define a price index with a value of one in the first year. In the second year, the price index has the value of the cost of goods in the second year divided by the cost of goods in the first year. Thus the price index in the second year is $x(P_B' + P_R')/x(P_B + P_R) = (P_B' + P_R')/(P_B + P_R) = (\$2 + \$6)/(\$1 + \$3) = \$8/\$4 = 2$. The inflation rate is then (2 - 1)/1 x 100% = 100%. Since the prices of all goods rise by 100 percent, the farmers get a 100 percent increase in their incomes to go along with the

100 percent increase in prices, so neither is affected by the change in prices.

b. If the price of beans rises to \$2 and the price of rice rises to \$4, then the price index in the second year is $(P_B' + P_R')/(P_B + P_R) = (\$2 + \$4)/(\$1 + \$3) = \$6/\$4 = 1.5$, so the inflation rate is (1.5-1)/1 x 100% = 50%. Bob is better off because his dollar revenues doubled (increased 100 percent) while inflation was only 50 percent. Rita is worse off because inflation was 50 percent, so the prices of the goods she buys rose faster than the price of the goods (rice) she sells, which rose only 33 percent.

c. If the price of beans rises to \$2 and the price of rice falls to \$1.50, then the price index in the second year is $(P_B' + P_R')/(P_B + P_R) = (\$2 + \$1.50)/(\$1 + \$3) = \$3.50/\$4 = 0.875$, so the inflation rate is (0.875-1)/1 x 100% = -12.5%. Bob is better off because his dollar revenues doubled (increased 100 percent) while prices overall fell 12.5 percent. Rita is worse off because inflation was -12.5 percent, so the prices of the goods she buys didn't fall as fast as the price of the goods (rice) she sells, which fell 50 percent.

d. The relative price of rice and beans matters more to Bob and Rita than the overall inflation rate. If the price of the good that a person produces rises more than inflation, he or she will be better off. If the price of the good a person produces rises less than inflation, he or she will be worse off.

8. The following table shows the relevant calculations:

	(a)	**(b)**	**(c)**
(1) Nominal interest rate	10.0	6.0	4.0
(2) Inflation rate	5.0	2.0	1.0
(3) Before-tax real interest rate	5.0	4.0	3.0
(4) Reduction in nominal interest rate due to 40% tax	4.0	2.4	1.6
(5) After-tax nominal interest rate	6.0	3.6	2.4
(6) After-tax real interest rate	1.0	1.6	1.4

Row (3) is row (1) minus row (2). Row (4) is .40 x row (1). Row (5) is (1 - .40) x row (1), which equals row (1) minus row (4). Row (6) is row (5) minus row (2). Note that even though part (a) has the highest before-tax real interest rate, it has the lowest after-tax real interest rate. Note also that the after-tax real interest rate is much less than the before-tax real interest rate.

9. The shoeleather costs of going to the bank include the value of your time, gas for your car that is used as you drive to the bank, and the inconvenience of not having more money on hand. These costs could be measured by valuing your time at your wage rate and valuing the gas for your car at its cost. Valuing the inconvenience of being short of cash is harder to measure, but might depend on the value of the shopping opportunities you give up by not having enough money to buy things you want. Your college president differs from you mainly in having a higher wage, thus having a higher cost of time.

10. The functions of money are to serve as a medium of exchange, a unit of account, and a store of value. Inflation mainly affects the ability of money to serve as a store of value, since inflation erodes money's purchasing power, making it less attractive as a store of value. Money also is not as useful as a unit of account when there's inflation, because stores have to change prices more often and because people are confused and inconvenienced by the changes in the value of money. In some countries with hyperinflation, stores post prices in terms of a more stable currency, such as the U.S. dollar, even when the local currency is still used as the medium of exchange. And sometimes countries even stop using their local currency altogether, using a foreign currency as the medium of exchange as well.

11. a. Unexpectedly high inflation helps the government by providing higher inflation tax revenue and reducing the real value of outstanding government debt.

    b. Unexpectedly high inflation helps a homeowner with a fixed-rate mortgage because he pays a fixed nominal interest rate that was based on expected inflation, and thus pays a lower real interest rate than was expected.

    c. Unexpectedly high inflation hurts a union worker in the second year of a labor contract because the contract probably based the worker's nominal wage on the expected inflation rate. As a result, the worker receives a lower-than-expected real wage.

    d. Unexpectedly high inflation hurts a college that has invested some of its endowment in government bonds because the higher inflation rate means the college is receiving a lower real interest rate than it had planned.

12. The redistribution from creditors to debtors is something that happens when inflation is unexpected, not when it is expected. The problems that occur with both expected and unexpected inflation include shoeleather costs associated with reduced money holdings, menu costs associated with more frequent adjustment of prices, increased variability of relative prices, unintended changes in tax liabilities due to non-indexation of the tax code, and the confusion and inconvenience resulting from a changing unit of account.

13. a. The statement that "Inflation hurts borrowers and helps lenders, because borrowers must pay a higher rate of interest," is false. Higher expected inflation means borrowers pay a higher nominal rate of interest, but it is the same real rate of interest, so borrowers are not worse off and lenders are not better off. Higher unexpected inflation, on the other hand, makes borrowers better off and lenders worse off.

    b. The statement that "If prices change in a way that leaves the overall price level unchanged, then no one is made better or worse off," is false. Changes in relative prices can make some people better off and others worse off, even though the overall price level does not change. See problem 7 for an illustration of this.

    c. The statement that "Inflation does not reduce the purchasing power of most workers" is true. Most workers' incomes keep up with inflation reasonably well.