PROBLEMS (If necessary, write on another piece of paper):

Chap 16:
1) 3rd Edition: p. 347, Questions and Review, Q5, Q6, Q7, and Q8
   4th Edition: p. 354, Questions and Review, Q5, Q6, Q7, and Q8
   Q5. If the Fed wants to increase the supply of money with open-market operations, it purchases U.S. government bonds from the public on the open market. The purchase increases the number of dollars in the hands of the public, thus raising the money supply.

   Q6. Banks do not hold 100 percent reserves because it is more profitable to use the reserves to make loans, which earn interest, instead of leaving the money as reserves, which earn no interest. The amount of reserves banks hold is related to the amount of money the banking system creates through the money multiplier. The smaller the fraction of reserves banks hold, the larger the money multiplier, since each dollar of reserves is used to create more money.

   Q7. The discount rate is the interest rate on loans that the Federal Reserve makes to banks. If the Fed raises the discount rate, fewer banks will borrow from the Fed, so banks' reserves will be lower, and thus the money supply will be lower.

   Q8. Reserve requirements are regulations on the minimum amount of reserves that banks must hold against deposits. An increase in reserve requirements raises the reserve ratio, lowers the money multiplier, and decreases the money supply.

2) 3rd Edition: p. 348, Problems and Applications, Q9
   With a required reserve ratio of 10 percent, the money multiplier could be as high as $1 \div 0.10 = 10$, if banks hold no excess reserves and people do not keep some additional currency. So the maximum increase in the money supply from a $10 million open-market purchase is $100 million. The smallest possible increase is $10 million if all of the money is held by banks as excess reserves.

3) 3rd Edition: p. 348, Problems and Applications, Q10
   4th Edition: p. 355, Problems and Applications, Q8
   a. If the required reserve ratio is 5 percent, then First National Bank's required reserves are $500,000 \times 0.05 = 25,000$. Since the bank’s total reserves are $100,000$, it has excess reserves of $75,000$.

   b. With a required reserve ratio of 5 percent, the money multiplier is $1 \div 0.05 = 20$. If First National lends out its excess reserves of $75,000$, the money supply will eventually increase by $75,000 \times 20 = 1,500,000$.

Chap 17:
4) 3rd Edition: p. 374, Problems and Applications, Q1 (omit the price level question in part a. and omit part d.)
   4th Edition: p. 382 Problems and Applications, Q1 (omit the price level question in part a. and omit part d.)
   a. 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. Using your knowledge from part b (5% percent increase in GDP) and keeping 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.

5) 3rd Edition: p. 374, Problems and Applications, Q2
4th Edition: p. 382, Problems and Applications, Q2

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 (See page 353).

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.
When an American art professor spends the summer touring museums in Europe, he spends money buying foreign goods and services, so U.S. exports are unchanged, imports increase, and net exports decrease.

When students in Paris flock to see the latest Arnold Schwarzenegger movie, foreigners are buying a U.S. good, so U.S. exports rise, imports are unchanged, and net exports increase.

When your uncle buys a new Volvo, an American is buying a foreign good, so U.S. exports are unchanged, imports rise, and net exports decline.

When the student bookstore at Oxford University sells a pair of Levi's 501 jeans, foreigners are buying U.S. goods, so U.S. exports increase, imports are unchanged, and net exports increase.

When a Canadian shops in northern Vermont to avoid Canadian sales taxes, a foreigner is buying U.S. goods, so U.S. exports increase, imports are unchanged, and net exports increase.

If you take $X$ units of foreign currency per Big Mac divided by 2.49 dollars per Big Mac, you get $X/2.49$ units of the foreign currency per dollar; that’s the predicted exchange rate. See page 394 for equation $e = P*/P$, where $P*$ is foreign price and $P$ is domestic price.

**a.** Indonesia: $16,000/2.49 = 6,426$ rupiah/$

**b.** Hungary: $459/2.49 = 184$ forint/$

**c.** Czech Republic: $56.28/2.49 = 22.6$ koruna/$

**d.** Israel: $12/2.49 = 4.82$ shekel/$

**e.** Canada: $3.33/2.49 = 1.34C$/

Under purchasing-power parity, the exchange rate of the Israeli shekel to the Canadian dollar is $12$ shekels per Big Mac divided by $3.33$ Canadian dollars per Big Mac equals $3.6$ shekels per Canadian dollar. The actual exchange rate is $4.79$ shekels per dollar divided by $1.34$ Canadian dollars per dollar equals $3.57$ shekels per Canadian dollar. That is pretty close!
If you take $X$ units of foreign currency per Big Mac divided by 3.06 dollars per Big Mac, you get $X/3.06$ units of the foreign currency per dollar; that is the predicted exchange rate.

a. Indonesia: $14,600/3.06 = 4,771$ rupiah/$
   Hungary: $529/3.06 = 173$ forint/$
   Czech Republic: $56.30/3.06 = 18.4$ koruna/$
   Canada: $3.27/3.06 = 1.07C$/

b. Under purchasing-power parity, the exchange rate of the Hungarian forint to the Canadian dollar is $529$ forints per Big Mac divided by $3.27$ Canadian dollars per Big Mac equals $162$ forints per Canadian dollar. The actual exchange rate is $204$ forints per dollar divided by $1.24$ Canadian dollars per dollar equals $164.5$ forints per Canadian dollar.

c. The exchange rate predicted by the Big Mac index (162 forints per Canadian dollar) is very close to the actual exchange rate of 164.5 forints per Canadian dollar.