Part 1: Answer the following questions. Depict a diagram as required. (2 points each)

1. Discuss the effects of an unexpected permanent reduction of money supply in the U.S. on exchange rate, in the short run, the medium run and the long run. Will we observe exchange rate overshooting? Explain using a diagram. Show the time path of exchange rate.

ANSWER:

Short Run:
The unexpected and permanent money reduction caused the real money supply to reduce, because price is sticky in the short run. In Fig. 1A, the money market equilibrium moves from point 1 to point 2. The interest rate then rises from $R_1$ to $R_2$. At the same time, the expectation of future exchange rate falls from $E_{t+1}$ to $E'_{t+1}$ and this caused the dollar return of the euro asset to fall. The reason is that in the long run money supply reduction will create deflation and causes the dollar to appreciate in the long run. As a result, the short run equilibrium in the foreign exchange market moves from point 1' to point 2'.

Medium Run:
In the medium run, price level begins to fall. The real money supply begins to rise towards its original level. Interest rate gradually falls back to its original level too. As a result, the dollar depreciates in the medium run.

Long Run:
In the long run, the price adjustment is completed and it brings the real money supply back to its original level. Interest rate falls back to its original level too. The exchange rate however does not go back to $E_1$, because the expectation of future
exchange rates has permanently changed. So, the long run exchange rate $E_3$ is lower than the original level $E_1$, $E_3 < E_1$.

In this case, there is exchange rate overshooting.

Overshooting is the situation in which long run exchange rate change is smaller than short run change.

Long run change: $E_1 - E_3$
Short run change: $E_1 - E_2$

$E_1 - E_2 > E_1 - E_3$

2. Suppose the Fed announces the policy in Question 1 one year in advance. How will your answer change? Will we observe exchange rate overshooting? Explain using a diagram. Show the time path of exchange rate.

ANSWER:

If the Fed announces the policy in advance, the expectation of the future exchange rate will change at the time of the announcement. At the time of the announcement expectation changes from $E_{et+1}^e$ to $E_{et+1}^{e'}$ (see fig. 2A) and the dollar return on the euro asset falls. The immediate equilibrium in the money market and the foreign exchange market are points 2 and 2’. Exchange rate appreciates immediately from $E_1$ to $E_2$.

When money supply is reduced 1 year later the interest rate rises and that causes exchange rate to appreciate from $E_2$ to $E_3$.

In the medium run, as price level falls, real money supply and interest rate gradually move towards their original level. In the long run, the exchange rate eventually depreciates from $E_3$ to $E_2$.

There is exchange rate overshooting in the short run, although exchange rate becomes less volatile than in Question 1.

3. Use the AA-DD framework to explain the effects of a temporary tax cut in the US on the dollar-euro exchange rate in the short run. What are the effects on the US current account and output of the US trading partner?

ANSWER:

Tax cut expands aggregate demand by increasing "‘disposable income’‘. This leads to more consumption. Although this also leads to more imports, the effect on consumption are stronger than on imports. This causes the DD curve to shift to the right, since the tax cut works through the goods market.

The demand expansion leads to output expansion which raises the real money demand. The domestic interest rate then rises and causes the exchange rate to fall
from $E_1$ to $E_2$. Therefore a temporary tax cut causes the dollar to appreciate. See Figure 3.

Part 2: Answer whether the following statements are true or false. When you think it is true, write ”T” in front of the question. Write ”F” otherwise. (0.5 point each)

1. The relative purchasing power parity predicts that real exchange rate is always one.  
   ANSWER: False  
   Correct Statement: The relative purchasing power parity predicts that real exchange rate is always constant. In fact, the absolute purchasing power parity predicts that real exchange rate is always one.

2. The monetary approach predicts that the euro-dollar exchange rate is not affected when the Fed and the ECB expand money supply at the same rate, all else equal.  
   ANSWER: True  
   Reason: What matters to exchange rate is relative money supply of the two countries.

3. According to the monetary approach, economic growth in the export sector causes real exchange rate to appreciate.  
   ANSWER: False  
   Correct Statement: According to the monetary approach, economic growth in the export sector causes nominal exchange rate appreciate. This is because economic growth creates output expansion which results in real money demand expansion. It then reduces the national price level and makes nominal exchange rate appreciate. In fact, the monetary approach always predicts that real exchange rate is one.

4. According to the general theory, output expansion causes real exchange rate to appreciate.  
   ANSWER: False  
   Correct Statement: According to the general theory, output demand expansion causes real exchange rate to appreciate. It is not clear from this question whether output demand or supply expands. The other possible correct statement would be that according to the general theory, output supply expansion causes real exchange rate to depreciate.

5. According to the general theory, output expansion causes nominal exchange rate to appreciate.  
   ANSWER: False  
   Correct Statement: According to the general theory, output expansion can cause nominal exchange rate to appreciate or depreciate. Output expansion raises real money demand and reduces the price level. Then, its effect on the relative price level causes exchange rate to appreciate. However, its effect on real exchange rate
is the opposite direction, as in Question 4. So, the overall effect on exchange rate is ambiguous.

6. According to the Balassa-Samuelson hypothesis, economic growth in the export sector causes real exchange rate to appreciate.
   ANSWER: True
   Reason: Balassa-Samuelson hypothesis tries to explain deviation from the absolute and relative purchasing power parity, i.e. the phenomenon that real exchange rate is not one or constant over time. According to the hypothesis, the economic growth in the export sector raises the labor costs in the economy across the board, since it raises demand for labor. As a result, it raises the national price level and creates real exchange rate appreciation.

7. A temporary fiscal expansion and a temporary monetary expansion have the same effect on nominal exchange rate.
   ANSWER: False
   Correct statement: A temporary fiscal expansion and a temporary monetary expansion have the opposite effect on nominal exchange rate. A fiscal expansion creates appreciation, but a monetary expansion creates depreciation.

8. According to the aggregate demand theory, the Fed can improve the US current account by expanding money supply.
   ANSWER: True
   Reason: A temporary money expansion creates exchange rate depreciation. That results in real exchange rate depreciation in the short run, since price is sticky. A temporary money expansion then raises international competitiveness of the US goods and improves the current account.
Figure 1A: Unanticipated permanent money reduction

\[ R_{t+1}^e + \frac{E_{t+1}^e - E_t}{E_t} \]

\[ L(R,Y) \]

\[ M/P \]
Figure 1B: Time path of exchange rate

Time 0: Short run

From Time 0 to T: Medium Run

Time T: Long run
Figure 2A: Effects of Pre-announcement

\[ R_e + \frac{E_{t+1}^e - E_t}{E_t} \]

L(R, Y)

1 = 2

$\text{return}$
**Figure 2B: Time path of exchange rate with pre-announcement**

- **Time A**: Time of announcement
- **Time 0**: Short run
- **Time 0 to T**: Medium run
- **Time T**: Long run

E2 - E3 = overshooting
Figure 3: Temporary Tax cut and aggregate demand

![Graph showing the impact of a temporary tax cut on aggregate demand. The graph illustrates the shift from initial equilibrium Y1 to a new equilibrium Y2 after the tax cut.]