24) If the aggregate demand curve shifts rightward following an increase in the quantity of money, what can be concluded if the short-run aggregate supply curve is rather steep?
   A) There is significant unemployment and slack in the economy.
   B) There will be little increase in real GDP but a significant increase in the price level.
   C) There will be a significant increase in both real GDP and the price level.
   D) There will be a significant increase in real GDP with little impact on the price level.

**Answer:** The increase in quantity of money would shift the vertical money supply curve out so that the new equilibrium interest rate associated with the intersection point of the new money supply and the money demand is lower. With lower interest rate, investment and consumption go up, leading to increase in aggregate demand. From the question, the short-run aggregate supply is steep. Let's say it's a vertical line (extreme case). With the vertical AS, when AD increases, there is no (or little increase in real GDP in a less extreme case) change in real GDP but a significant increase in price level.

25) In the long run, a decrease in the quantity of money will
   A) increase nominal GDP.
   B) increase real GDP.
   C) increase the price level.
   D) have no lasting impact on real GDP.

**Answer:** The long run aggregate supply is vertical. The change in quantity of money and consequently the change in aggregate demand would have no impact on the level of real GDP but the price level.

26) In the above figure, suppose point A is the original equilibrium. If there is an increase in the quantity of money that shifts the aggregate demand curve to $AD_1$, the new short-run equilibrium is given by point
   A) A (that is, the equilibrium does not change).
   B) B.
   C) C.
   D) D.

27) In the above figure, suppose point A is the original equilibrium. If there is an increase in the quantity of money that shifts the aggregate demand curve to $AD_1$, the long-run price level is
   A) 110.
   B) 90.
   C) 100.
   D) 120.
**Answer:** short-run equilibrium occurs where SAS = AD. When AD shifts out because of the increase in the quantity of money, the economy moves from point A to point C in the short-run. As can be seen, the price level goes up to 110 in the short-run. Because of the increase in price, labor demands higher wage. The cost of production goes up and SAS shifts to the left so that it crosses LAS and AD1 at point D. The long-run price level is then 120.

29) The equation of exchange:
   A) is $MV = PY$.
   B) cannot be used in an economy with inflation.
   C) becomes the quantity theory if velocity and the price level are constant.
   D) All of the above answers are correct.

30) According to the equation of exchange, if $M = $400, $P = $8, and $Y = $200, then
    A) $V$ cannot be determined.
    B) the price level must fall.
    C) $V$ is 4.
    D) nominal GDP is $800.

**Answer:** by definition, the equation of exchange is $MV = PY$. From 30), one has:

$$400(V) = (8)(200) \rightarrow V = 1600/400.$$ 

32) According to the quantity theory of money, changes in the price level are usually the result of changes in the
    A) real interest rate.
    B) velocity of circulation.
    C) quantity of money.

34) According to the quantity theory of money,
    A) an increase in the quantity of money will increase real output.
    B) a decrease in the quantity of money will decrease the price level.
    C) a decrease in the quantity of money will decrease the velocity of circulation.
    D) an increase in the quantity of money will decrease real output.

35) Which of the following is true regarding the quantity theory of money?
    I. The theory predicts that in the long run the inflation rate equals the money growth rate minus the growth rate of potential GDP.
    II. The theory predicts that countries with high growth rates of money will have high inflation rates.
    III. The long-run U.S. relationship between money growth and inflation supports the theory.
    A) I and III
    B) II and III
    C) I, II and III
    D) I and II

**Answer:** the quantity theory of money states that in the long-run, an increase in the quantity of money would lead to equal percentage increase in the price level. From the equation of exchange, if $V$ and $Y$ are constant\(^1\), $P = (V/Y)M \leftrightarrow P = (\text{constant})M$. so $\Delta P = (\text{constant})\Delta M \leftrightarrow \Delta P/P = (\text{constant})\Delta M/P$. And because $P = (\text{constant})M$, one has that $\Delta P/P = \Delta M/M$. In other words, inflation = money growth. Therefore, high growth rates of money will lead to high inflation rates.

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\(^1\) $V$ and $Y$ are not affected by the change in $M$. $Y$ is the real output and has nothing to do with $M$. $Y$ can only be affected by the production technology. Financial deregulation and innovation can change $V$. 
Now, if in the long-run, there is also change in potential GDP. From \( P = (V/Y)M \), one has that (using calculus: total differentiation) 
\[
dP = (V/Y)dM - (VM/Y^2)dY.
\]
Divide through by \( P \), one has 
\[
dP/P = (V/YP)dM - (VM/PY^2)dY.
\]
And because \( P = (V/Y)M \), one has 
\[
dP/P = dM/M - dY/Y.
\]
In other words, inflation = money growth – growth in potential GDP. Intuitively, from \( P = (V/Y)M \), if \( M \) doubles, \( P \) doubles. If \( Y \) doubles, \( P \) goes down 2 folds. As a result, the total change in \( P \) from simultaneous change in \( M \) and change in \( P \) would equal 0.