Suppose that you have the following money demand function:

\[
\frac{M^D}{P} = 500 + .2Y - 10i
\]

Where \(Y\) is GDP per capita (in thousands), \(i\) is the interest rate as a percentage (i.e. 8% = 5), \(M\) is the M1 money supply in billions and \(P\) is the price level. The money multiplier is currently 4.

a) Suppose that GDP per capita is currently $40,000, the interest rate is currently 5% and the M1 money supply is currently $687B. Calculate the current price level.

Plug in everything and solve for \(P\)

\[
\frac{687}{P} = 500 + .2(40) - 10(5)
\]

\[P = 1.5\]

b) Suppose that the Fed wanted to lower the interest rate to 4%. Calculate the open market transaction necessary to accomplish this.

Keeping \(P\) at 1.5, substitute in the new interest rate and solve for \(M\)

\[
\frac{687}{P} = 500 + .2(40) - 10(4)
\]

\[M = 702\]

Therefore, the change in M1 is 15, so the change in the base is \(15/4 = 3.25\). An open market purchase is necessary.

c) Continuing from (b), if the Fed is targeting the interest rate at 4% and GDP per capita rises to $50,000, calculate the open market transaction necessary to maintain the target.

Plug in the new values and solve for \(M\)
\[
\frac{687}{P} = 500 + 0.2(50) - 10(4)
\]

\[M = 705\]

The change in M1 is 3, so the change in the base is \(\frac{3}{4} = 0.75\). An open market purchase is required.