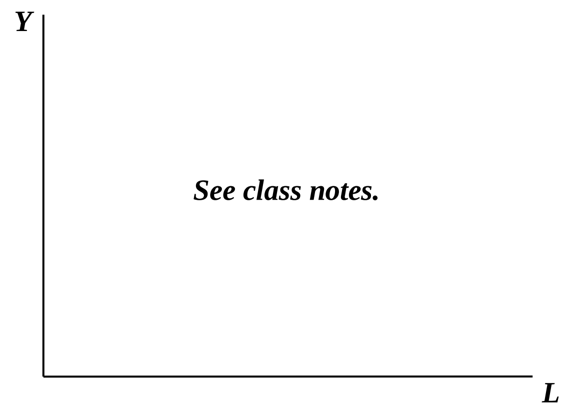
Name: _____Solutions______

Cosumnes River College
Principles of Macroeconomics
Problem Set 6
Due April 3, 2017

Spring 2017 Prof. Dowell

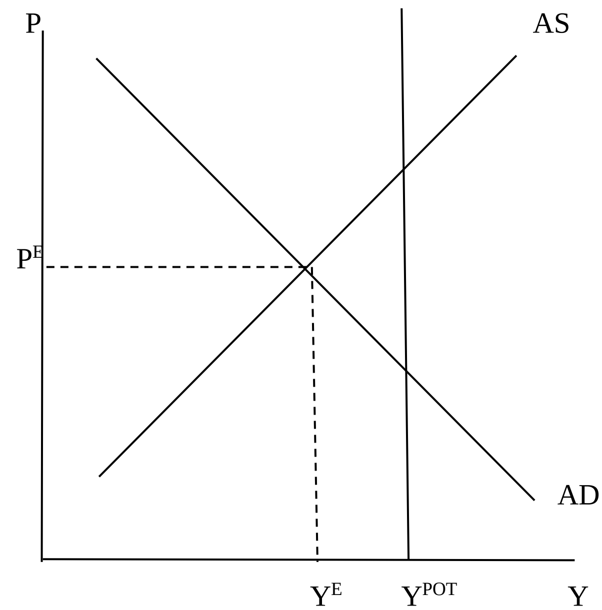
Instructions: Write the answers clearly and concisely on these sheets in the spaces provided. Do not attach extra sheets.

1. Draw a diagram that shows how labor market equilibrium and the short-run production function determine output. Explain what is happening in the diagram.



See class notes.

2. a. On the axes below, use an aggregate supply and demand diagram to illustrate an equilibrium in which there is a recessionary gap. Be sure to clearly label everything.



b. Clearly and thoroughly explain the "automatic" process through which the economy adjusts to close this gap.

Unemployed workers would compete for jobs, bidding wages down. Labor supply shifts right as a result, also shifting AS right. This process continues until output returns to potential, but at a lower price.

c. How long does the adjustment process take?

A very long time.

3. Why do wages tend to be rigid, particularly in the downward direction?

   See class note or text for full discussion:

   Minimum wage
   Union contracts
   Efficiency wages
   Psychological factors

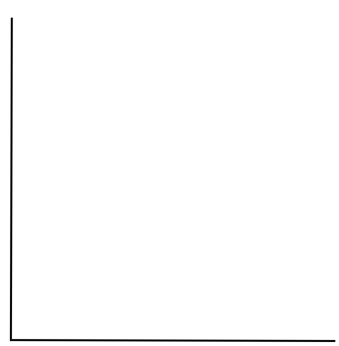
4. Explain in words why rising prices reduce the multiplier effect of an autonomous increase in aggregate demand.

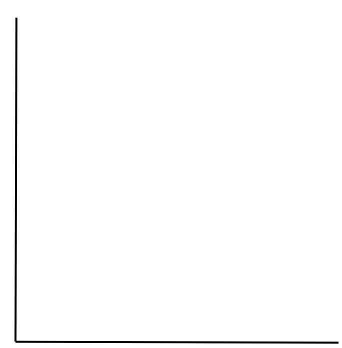
   Rising prices reduce real wealth which shifts the consumption function downward. This in turn reduces output demanded as we move up the AD curve.

4. What is the difference between the classical and the extreme Keynesian versions of the aggregate supply curve? What are the assumptions about prices and wages for each?

   For the extreme Keynesian version. The curve is horizontal. Prices and wages are both fixed. For the classical version, the curve is vertical and prices and wages are both fully flexible.

5. Use aggregate supply and demand diagrams to show that the multiplier effects are smaller when the aggregate supply curve is steeper. Which case gives rise to more inflation – the steeper aggregate supply curve or the falter one? What happens to the multiplier in the case of the classical (vertical) aggregate supply curve?





6. This is a lengthy question which requires a substantial amount of simple algebra. The question serves two purposes. First, it gives you a chance to practice solving our model – something which many of you need! Second, it will demonstrate mathematically the effects of price level changes on the size of the multiplier.

   In Davisville, consumers spend (consume) according to the equation C = 200 + 0.8(Y-T). Investment is 600, government purchases are 500, exports are 300, imports are 400, and taxes are fixed at 500.

   a. Find the equilibrium level of GDP. If full employment comes at Y^{POT} = 6,000, is there a recessionary or an inflationary gap and how large is it?

      Y = C + I + G + (X – M)
      Y = 200 + 0.8(T – 500) + 600 + 500 + (300 – 400)
      Y = 200 + 0.8Y – 400 + 600 + 500 – 100
      Y = 800 + 0.8Y
      0.2Y = 800
      Y^E *= 4000*

      There is a recessionary gap of 2000.

   b. Now suppose neighboring countries increase their demand for Davisville's exports from 300 to 425. Find the new equilibrium level of GDP. Now, is there a recessionary or an inflationary gap and how large is it?

      Y = C + I + G + (X – M)
      Y = 200 + 0.8(T – 500) + 600 + 500 + (425 – 400)
      Y = 200 + 0.8Y – 400 + 600 + 500 + 25
      Y = 925 + 0.8Y
      0.2Y = 925
      Y^E *= 4625*

      There is still a recessionary gap, but it has been reduced to 1375.

   c. What is the value of the multiplier?

      k = 1/(1 – b) = 1/(1 -0.8) = 1/0.2 = 5

   d. Now the citizens of Davisville change their spending habits on imports from M = 400 (that is, imports fixed at 400) to M = 300 + 0.05Y (that is, imports are 300 + five percent of GDP). Exports, investment and the government budget are as in part (a). Answer questions (a), (b) and (c) again, using this new import function.

      For part a:
      Y = C + I + G + (X – M)
      Y = 200 + 0.8(T – 500) + 600 + 500 + (300 – (300 + 0.05Y))
      Y = 200 + 0.8Y – 400 + 600 + 500 + 300 – 300 – 0.05Y
      Y = 900 + 0.75Y
      0.25Y = 900
      Y^E *= 3600*

      There is a recessionary gap of 2400.

For part b:
$Y = C + I + G + (X – M)$
$Y = 200 + 0.8(T – 500) + 600 + 500 + (425 – (0 + 0.05Y))$
$Y = 200 + 0.8Y – 400 + 600 + 500 + 425 – 300 – 0.05Y$
$Y = 1025 + 0.75Y$
$0.25Y = 1025$
$Y^E = 4100$

There is still a recessionary gap, but it has been reduced to 1900.

For part c:
$k = 1/(1 – b + m) = 1/(1 -0.8 + 0.05) = 1/0.25 = 4$

e. We now allow the price level in Davisville to vary. Go back to all the conditions of part (a), except change the consumption function to C = 0.04(ω/P) + 0.8(Y – T) where ω is the nominal or money value of wealth and P is the price level: hence, ω/P is real wealth. The money value of wealth is fixed at ω = 5000 throughout this problem, but P will change. Make the necessary substitutions and writ out the consumption function.

The only thing to do here is to substitute ω = 5000 into the consumption function and simplify.

$C = 0.04(\omega/P) + 0.8(Y – T)$ □ $C = 0.4(5,000/P) + 0.8(Y – T)$
□ $C = 200/P +0.8(Y – T)$

f. Assume first that P = 1. Find equilibrium GDP.

Substitute the consumption function from above in and solve for Y^E. Since everything is the same as in part a though, your answer will be the same as well, $Y^E = 4000$.

g. Repeat the calculations for P = 1.25 and for P = 0.80.

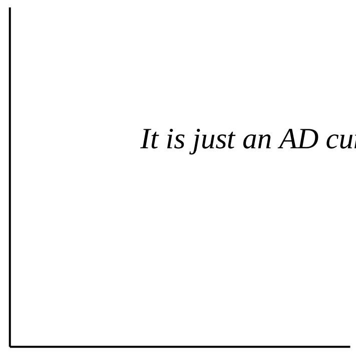
For P = 1.25 we get $C = 200/1.25 +0.8(Y – T)$ □ $C = 160 + 0.8(Y – T)$

$Y = 160 + 0.8(T – 500) + 600 + 500 + (300 – 400)$
$Y = 160 + 0.8Y – 400 + 600 + 500 – 100$
$Y = 760 + 0.8Y$
$0.2Y = 760$
$Y^E = 3800$

For P = 0.8 we get $C = 200/0.8 +0.8(Y – T)$ □ $C = 250 + 0.8(Y – T)$

$Y = 250 + 0.8(T – 500) + 600 + 500 + (300 – 400)$
$Y = 250 + 0.8Y – 400 + 600 + 500 – 100$
$Y = 850 + 0.8Y$
$0.2Y =850$
$Y^E = 4250$

h. Plot the above results (part (f) and part (g)) on a diagram with price on the vertical axis and output on the horizontal axis. Interpret this graph.



i. Now, suppose that the aggregate supply curve is horizontal at P =1. If exports rise by 100 (that is from 300 to 400), what happens to GDP? How large is the multiplier?

In this case, we can use our results from part (f), increase exports by 100, and calculate the multiplier. From part (f) we have $Y^E = 4000$. *Changing exports to 400 and recalculating* Y^E *we get:*

$Y = C + I + G + (X - M)$
$Y = 200 + 0.8(T - 500) + 600 + 500 + (400 - 400)$
$Y = 200 + 0.8Y - 400 + 600 + 500$
$Y = 900 + 0.8Y$
$0.2Y = 900$
$Y^E = 4500$

The multiplier is $(4500 - 4000)/(400 - 300) = 500/100 = 5$. *We can also use the simple formula of* $1/(1 - b)$ *to get* $1/(1 - 0.8) = 1/0.2 = 5$.

j. Now suppose instead, that P is unknown; the aggregate supply curve is Davisville is given as $Y = 5000 - 500/P$. Find equilibrium GDP now.

First, recall that we derived the demand curve by varying the price in the Keynesian Cross Diagram. We accomplish the same thing in an equation if we leave P as a variable. Given our consumption function, we do this as follows:

$C = 0.04(\omega/P) + 0.8(Y - T)$ $C = 0.04(5000/P) + 0.8(Y - T)$ $C = 200/P + 0.8(Y - T)$

Substitute this, and all the other information from the problem into the national income identity and simplify.

$Y = 200/P + 0.8(Y - 500) + 600 + 500 + (300 - 400)$
$Y = 200/P + 0.8Y - 400 + 600 + 500 - 100$
$Y - 0.8Y = 200/P + 600$
$0.2Y = 200/P + 600$
$Y = 1000/P + 3000$ *which is the equation of the aggregate demand curve.*

To find equilibrium, we solve the system of two equations
1000/P + 3000 = 5000 – 500/P
1500/P = 2000
P = 0.75		*Y = 4333.33*

k. Now, let exports rise from 300 to 400 again. What is the new equilibrium level of GDP? What, therefore, is the multiplier?

Y =200/P + 0.8(Y – 500) + 600 + 500 + (400 – 400)
Y = 200/P + 0.8Y – 400 + 600 + 500
Y – 0.8Y = 200/P + 700
0.2Y = 200/P + 700
Y = 1000/P +3500 which is the equation of the aggregate demand curve.
To find equilibrium, we solve the system of two equations

1000/P + 3500 = 5000 – 500/P
1500/P = 1500
P = 1		*Y = 4500*

$$k = \frac{\Delta Y}{\Delta M} = \frac{166.67}{100} = 1.67$$

l. Explain why your answers in part (c0 and part (k) differ.

The multiplier is much smaller in the second case because of the effects of inflation which reduce real wealth and consumption.