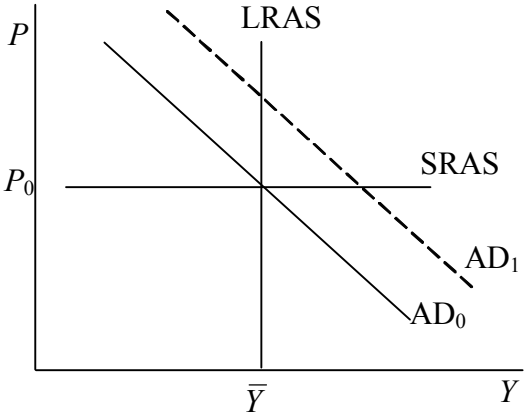
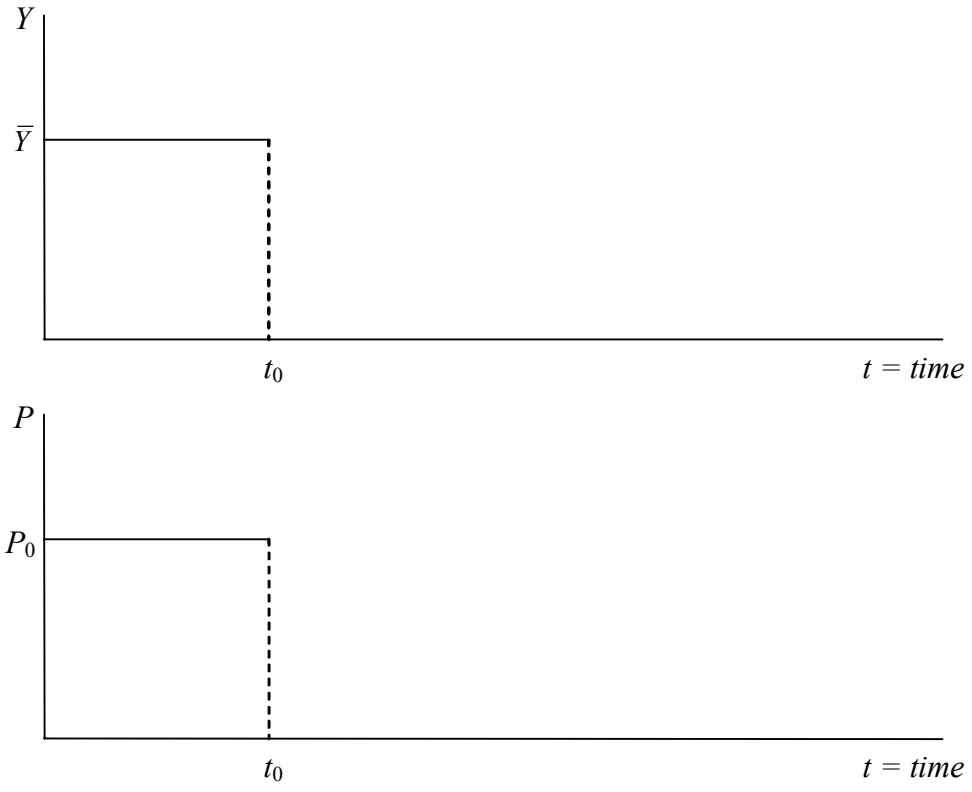
Homework #2
Due February 5, 2004

Answer all questions on these sheets, adding extra sheets where necessary.

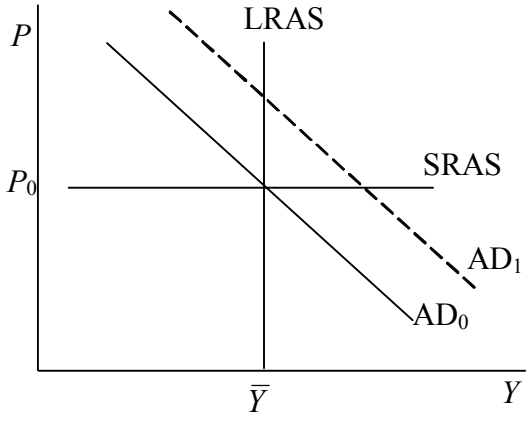
1. Suppose that up to time t_0 an economy has remained stationary at income level $\bar{Y}$ and price level P_0 as in the figure at the right. Now a stimulus to aggregate demand shifts the aggregate demand curve to the right, to AD_1 as shown. In graphs that have been begun for your below, trace the path over time of income and the price level that will result under the assumptions stated about the permanence of the shift in aggregate demand. In each case, draw a path for Y and P over time that is consistent with what you know about the way that this model of economic fluctuations behaves. Add lines and labels to the figures (including the one at the right) as necessary to clarify.



   a. Assume first that the shift in aggregate demand is permanent. That is, AD shifts to AD_1 at t_0 and stays there forever.



b. Now assume that the increase in aggregate demand is temporary, lasting only until some time $t_1 > t_0$, at which point AD then returns to AD_0. Assume that t_1 is long enough after t_0 for a noticeable portion of the adjustment from short run to long run to have occurred.



2. Using the space below, draw your own diagrams of the same sort as in question 1 above to analyze the effects in the short run and over time of a sudden decrease in the economy's long-run level of output, $\overline{Y}$. Assume that this happens without any shift in the aggregate demand curve, AD, from its initial position in a previous long-run equilibrium like the one you started with in questions 1. Assume also that the price level does not immediately change (that is, the SRAS curve does not initially move with the decrease in long-run output).

3. The following equations represent the aggregate supply and demand model, augmented here to include an explicit dynamic adjustment process for the price level. It also has a policy variable, *M* (it could be monetary policy) that shifts aggregate demand and that may be used to try to stabilize the economy.

LRAS:	$\overline{Y} = 100$	(1)
SRAS:	$P_0 = 100$	(2)
AD:	$Y_t = 200 - P_t + X_t + M_{t-1}$	(3)
Price dynamics:	$P_t = P_{t-1} + \alpha(Y_{t-1} - \overline{Y})$	(4)
Policy dynamics:	$M_t = M_{t-1} - \beta(Y_{t-1} - \overline{Y})$	(5)

The first three equations simply formalize what we have seen in our graphs, except that the aggregate demand equation includes both an exogenous shock, X_t, and a lagged effect of the policy variable, M_{t-1}. Equation (4) says that the price level rises to the right of $\overline{Y}$ and falls to the left of it, the speed of its adjustment being proportional to the distance from $\overline{Y}$ with a parameter α. That is, the bigger is α, the more rapidly the economy will adjust to its long-run equilibrium at $\overline{Y}$. Equation (5) describes the behavior of a policy authority that is trying to use the policy variable, *M*, to adjust the economy toward $\overline{Y}$. The rule that it embodies is simply to reduce *M* when *Y* is above $\overline{Y}$ and raise it when *Y* is below $\overline{Y}$, the size of the adjustment being set by another parameter, β.

a. Trace the dynamics of this system for 10 periods, filling in the table below. (You will probably want to do this on a spreadsheet and just attach your own printout of this table, rather than filling it in by hand.) The table gives you initial values for the variables, as well as settings for the parameters α and β. In this first case, the policy is not used at all (β=0), and the system simply shows how the aggregate supply and demand system responds to a permanent positive shock to aggregate demand.

   Once you have filled in the table, describe below what the effects of this demand shock have been on prices and income, in the short run, and then over time.

Parameters: $\alpha = 0.5$
$\beta = 0$

Period t	$X(t)$	$Y(t)$	$P(t)$	$M(t)$
–1	0	100.00	100.00	0.00
0	10	110.00	100.00	0.00
1	10	105.00	105.00	0.00
2	10			
3	10			
4	10			
5	10			
6	10			
7	10			
8	10			
9	10			
10	10			

b. Now repeat the exercise allowing policy to respond, with a parameter $\beta=0.05$.

Parameters: $\alpha = 0.5$
$\beta = 0.05$

Period t	$X(t)$	$Y(t)$	$P(t)$	$M(t)$
–1	0	100.00	100.00	0.00
0	10			
1	10			
2	10			
3	10			
4	10			
5	10			
6	10			
7	10			
8	10			
9	10			
10	10			

What difference has the use of stabilization policy made, compared to part (a)?

c. One more time, allow the policy response parameter to be quite a bit larger, β=1.2.

Parameters: α = 0.5
β = 1.2

Period *t*	*X*(*t*)	*Y*(*t*)	*P*(*t*)	*M*(*t*)
–1	0	100.00	100.00	0.00
0	10			
1	10			
2	10			
3	10			
4	10			
5	10			
6	10			
7	10			
8	10			
9	10			
10	10			

Now what happens?

4. The equations below represent the model of Mankiw's Chapter 3, which determines the endogenous variables Y, W, r, C, and I, in terms of the exogenous variables $\overline{K}$, $\overline{L}$, $\overline{G}$, and $\overline{T}$.

Production function:	$Y = F(\overline{K}, \overline{L})$	(1)
Wage:	$W = MPL = F_L(\overline{K}, \overline{L})$	(2)
Consumption:	$C = C(Y - \overline{T})$	(3)
Investment:	$I = I(r)$	(4)
Goods market equilibrium:	$Y = C + I + \overline{G}$	(5)

where $F_L(\ )$ is the partial derivative of F with respect to its second argument. Using the known properties (including that $0<MPC<1$) of the several functions in this system, determine the effect of each exogenous variable on each endogenous variable, and record your results in the table below as +, –, 0, or ?, where the question mark means that the effect is theoretically ambiguous.

	Effects on:				
Due to changes in:	Y	W	r	C	I
$\overline{K}$					
$\overline{L}$					
$\overline{G}$					
$\overline{T}$					

5. A handy source of macroeconomic data is FRED, which is available online from the Federal Reserve Bank of St. Louis at http://research.stlouisfed.org/fred2/. Among other things, it reports data on U.S. GDP, prices, and the money supply. These are three of the variables that enter the quantity-theory equation, $MV=PY$. FRED does not report velocity, V, but you should be able to calculate that from the data they do provide. (You should answer this question on a separate sheet or sheets that you attach.)

   a. For the third quarter of 2003 (the most recent available as I write this), and using the M1 definition of the money supply from the beginning of that quarter, calculate the velocity of money, V. (Use seasonally adjusted data.) Write a short interpretation of what this number represents.

   b. Using the data from FRED, graph the velocity of money over time starting in 1960. (Note that you can download data from FRED in Excel format, which may be helpful in doing this.)

   c. What reason or reasons can you suggest for why velocity may have changed as it did since 1960?

   d. Using the Wall Street Journal of Monday, February 2, 2004, find the small item presenting "Federal Reserve Data." (On Monday January 26 this appeared at the bottom of page C5, in case that helps you find it.) Find the entry that is closest to measuring M1, and calculate the percentage by which this entry increased or decreased during the week reported there. Then, using the data on M1 that you looked up for part (b) above, calculate the average expansion or contraction of M1 per week during the third quarter of 2003. Comparing these two, in which period did M1 apparently grow faster? Does this suggest to you anything about the stance of U.S. monetary policy – that is, is monetary policy becoming more, or less, expansionary?

   e. Look now at the front page of the third section of the WSJ (page C1). Is anything there suggestive of the current stance of U.S. monetary policy?