KEY TO THE MIDTERM EXAMINATION

What follows are correct answers to the midterm questions. In some cases, they may not be the only correct answers, so people marking the exam should use their judgment. Award part marks when appropriate.

1. (21 points). Do not penalize a student more than once for the same mistake. For example, if she makes a mistake in identifying GDP in (a), allow her to use that mistaken GDP in subsequent parts.

(a) (7 pts) \( Y = C + I + G \)
\[
C = 100 + (2/3)(Y - T)
\]
\[
C = 100 + (2/3)(Y - 0.25Y)
\]
\[
C = 100 + (2/3)(0.75Y)
\]
\[
C = 100 + 0.5Y
\]
\[
Y = 100 + 0.5Y + 400 + 200
\]
\[
Y = 0.5Y + 700
\]
\[
Y - 0.5Y = 700
\]
\[
0.5Y = 700
\]
\[
Y = (1/0.5)(700) = 1400
\]
So the equilibrium GDP is 1400

(b) (1 pt) The multiplier is 2. I can be read directly from the calculation in (a), or it can be found from the formula \( 1/[1-b(1-t)] \).

(c) (3 pts) \( G = 200 \)
\[
T = 0.25Y = 0.25(1400) = 350
\]
Surplus = \( T - G = 350 - 200 = 150 \)

(d) (2 pts.) In an economy without foreign trade, the national income accounting identity is \( S + T = I + G \). The terms can, of course, be arranged in any manner. Students may just state the identity, or they may derive it from the definitions that output = \( C + I + G \) and income = \( C + S + T \) and output = income, or they may derive it from the condition that withdrawals from the circular flow identically equal injections into the circular flow.

(e) (4 pts) \( S = (Y - T) - C \), where \( Y = 1400 \), \( T = 350 \) (from answer c above), and \( C = 100 + 0.5Y \) (from answer a above) = \( 100 + 0.5(1400) = 100 + 700 = 800 \). So \( S = 1400 - 350 - 800 = 250 \). \( T = 350 \). \( I = 400 \). \( G = 200 \). So the values for the national income accounting identity are: 250 + 350 = 400 + 200, or 600 = 600, and the national income accounting identity hold.

(f) (i) (2 pts) Since the multiplier is 2 (from b above), an increase in \( G \) of 100 raises equilibrium GDP by 200, from 1400 to 1600. Students can, of course, work out the calculation from the beginning, but it is not necessary.
(ii) (2 pts.) \( G = 300 \). \( T = 0.25(1600) = 400 \). So the surplus = \( T - G = 400 - 300 = 100 \).

2. (9 points) This is a short essay question, and there can of course be different approaches to it. One might begin with the point that a perfectly even inflation,
perfectly anticipated, that raised every price in the world by the same proportion, would have no effect on any real variable, and so would be of no concern at all. So the damage caused by inflation must result from the unevenness of the price increases. Inflation redistributes real income in some random—and also not so random—ways. Some people gain and other people lose, due to no merit or fault of their own. Some people in particular lose, namely people on fixed incomes or incomes that adjust very slowly. So, for example, people on pensions that are not inflation adjusted, or people working for wages under contracts that do not adjust, are hurt. So are creditors hurt, if the inflation was unanticipated, and not compensated for in the interest rate. Of course, for every one of those people who is hurt, someone else gains: for the most part inflation involves the redistribution of national income, not a net loss. But in some circumstances, inflation may actually cause a net loss of income. For example, if investors cut back investment because inflation increases the atmosphere of uncertainty, economic growth will suffer, and future national income will be lower. Also, students might distinguish between slow or moderate inflation and rapid or galloping inflation. The latter causes enormous problems, and a distinct fall in real incomes, because people lose faith in the value of money and cease to use it, pushing the economy toward barter with a resulting loss in efficiency. These are some of the observations that might be put in a good answer. But there are others.

3. (8 points)
   (a) (4 points) The labor force consists of people working for pay for any length of time during the week, plus people not working for pay but looking for work. So it consists of the first three categories: $1,700 + 140 + 160 = 2,000$
   (b) (4 points) The numerator of the unemployment rate is people not working at all for pay but looking for work, while the denominator is the labor force. So the unemployment rate is $160/2,000 = 0.08$, or 8 percent.

4. (8 points). Income is a flow variable while wealth is a stock variable. Income is the money you earn over a period of time, say between January 1 and December 31 of a given year, or even between 8:00 a.m. and 5 p.m. of a given day. The period must be specified. It makes no sense to ask what income is a point in time. [Very good students may quote the Simons definition of income, which is consumption plus increase in net worth over a period, but don’t expect this]. Wealth is the value of what you own, minus what you owe. It may include money but is not restricted to money: it can include other paper assets like stocks and bonds, as well as real assets like houses and factories. It is measured at a point in time, say, the close of business on December 31. While income and wealth are different, they are related. For example, wealth may yield an income—for example, stock that you own may pay you a dividend. Also income that you earn may allow you to increase your wealth, if you hold onto it and don’t spend it all on consumer goods.

5. (16 points). Give 2 points for each correct answer. Give 1 point for each partially correct answer. Avoid half points.
   (a) Stock purchase not in GDP, because nothing is produced.
   (b) In GDP, as C of $3,000.
(c) In GDP, as I of $3,000
(d) In GDP, as X of $3,000
(e) Not in GDP, since the wine was not produced in the US.
(f) In GDP, as C of $1,000. The $1,000 represents the production of materials that Henry used. The production of the boat is not a market transaction and does not enter GDP, so its market value is irrelevant.
(g) In GDP, as C of $200.
(h) Not in GDP, because this work was not paid for in the market. Income foregone is irrelevant.

6. (20 points) Each correct answer counts for 2 points. Give 1 point for partially correct answers. Avoid half points.
(a) Fiscal policy. Decisions by the government with respect to taxation and expenditures.
(b) Intermediate good. A good which is produced, and then totally used up in the production of something else.
(c) Marginal propensity to save. The increase in savings, divided by the increase in income.
(d) Autonomous spending. All spending which is not influenced by the level of income.
(e) Real interest rate. The nominal or stated interest rate minus the rate of inflation.
(f) GDP. The money value of all final goods and services produced in a country over a period of time.
(g) Potential GDP. The level of GDP that could be produced if the capital stock and labor force were fully employed. Students may say that full employment does not mean 0 unemployment, or that the concept of potential GDP involves an inflation rate that is not accelerating, but this is not necessary.
(h) Stagflation. A situation in which unemployment and inflation are both increasing.
(i) Automatic stabilizer. Taxes that automatically rise when income rises and automatically fall when income falls, and government expenditures that do the reverse. They help to lower the value of the multiplier.
(j) Net exports. Exports minus imports.

7. (18 points) Give 2 points each for correct answers on (a) through (f), and 3 points each for correct answers to (g) and (h). This answer involves drawing diagrams, and since I can't do diagrams on this program, I will have to describe them.
(a) Draw a standard aggregate supply and demand diagram, axes correctly labeled as Y and P, SS₀ with a positive slope and DD₀ with a negative slope, intersecting at, say, point A, with equilibrium price level P₀ and initial output level Y_p (potential output).
(b) The increase in aggregate demand is shown by a new DD₁ curve, drawn to the right of the old one.
(c) Extend the horizontal line at P₀ to right, so that it intersects with DD₁ at, say B. Vertical line to horizontal axis shows what Y would be, say Y₁, if there were no price increase.
(d) B will not be achieved because of the positively sloped aggregate supply curve. Show the intersection at C, with a higher price level, say P₂, and income Y₂ that is somewhere between Y_p and Y₁.
(e) Aggregate supply curve will shift to the left, to SS₁, because at C, prices have risen but wages have not, so real wages, W/P, have fallen, so workers will take steps to raise their money wage, so as to at least restore the original real wage. This rise in money wages is represented by a reduction in aggregate supply.

(f) The decline in aggregate supply leads to excess demand, so prices rise and output falls and a new equilibrium is established at, say D, with prices P₃ higher than P₂, and output Y₃ lying between Yₚ and Y₂.

(g) At D, prices have risen again, so real wages have fallen, so the process described in e and f above will continue, with further increases in money wages, decline in aggregate supply, increase in prices and reduction in output. The final equilibrium occurs when aggregate supply has fallen all the way to SS₂, where it intersects, at say E, with DD₁ at the original potential output level Yₚ. This is the end of the adjustment process, because at this point prices have risen the same proportion as wages, and so the original real wage is restored. At the final equilibrium, the price level has risen, and the real output level has been restored.

(h) This adjustment, back to the original level of output, may be fast or slow. It depends upon how fast firms raise their prices, and how long it takes for workers to get their money wages adjusted upwards. In the case of wages, note that the workers may not wait to fall behind, each time, and then just readjust enough to restore their original real wage. They may anticipate the full extent of the eventual inflation, and push their money wage up to its final equilibrium immediately, or at least very quickly. If so, the overall adjustment will occur relatively quickly.
Economics 2, UCSC, Winter Quarter 2002: Key to the Midterm Examination

I hope that the following are correct answers to the exam questions, but they may not be the only correct answers. You may have to use your judgment.

1. 20 points total. 2 points for each right answer. Give 1 point for partially correct answers (avoid half points).
   (a) Marginal propensity to save. The increase in saving divided by the increase in income. Or, the amount by which saving rises when income rises by 1.
   (b) Investment. An increase in the capital stock.
   (c) New classical macroeconomics. A school believing (or even, perhaps, demonstrating) that equilibrium GDP, or actual GDP, is always at or very close to its natural (or perhaps full employment) level. Also known as the school of rational expectations.
   (d) Marginal tax rate. The increase in tax payments divided by the increase in income that leads to the increase in taxes.
   (e) Federal government surplus. The amount by which federal taxes exceed federal spending.
   (f) Gross domestic product. The market value of all final goods and services produced in the country over a period of time.
   (g) Consumption function. The consumption function shows the effect of national income upon national consumption.
   (h) Inflation. An increase in an average of all prices (or a weighted average).
   (i) Unemployment rate. The numerator is the number who have not worked at all for pay in the previous week but who have looked for work. The denominator is the labor force, consisting of the unemployed (as just defined) plus the employed, that is, people who worked for pay in the last week.
   (j) Real balance effect. When prices rise, wealth held in the form of money is less valuable, and hence consumption falls.

2.
   (a) (6 points) \( Y = C + I + G \) is the equilibrium condition for GDP.
   Substituting the tax function into the consumption function we get:
   \[
   C = 500 + (2/3)[Y – (180 + 0.25Y)]
   C = 500 + (2/3)(0.75Y – 180)
   C = 500 + 0.5Y – 120
   C = 380 + 0.5Y
   \]
   Substituting the given values for the right hand side of the equilibrium equation:
   \[
   Y = 380 + 0.5Y + 600 + 820
   Y = 1800 + 0.5Y
   0.5Y = 1800
   Y = (1/0.5)1800
   Y = 2(1800)
   Y = 3600.
   \]
   So GDP is 3600
   (b) (1 point) The multiplier is 2, as can be seen from the second-to-last line in the above calculation. If students want to use the formula, it is: \( \text{Mult} = 1/[1-b(1-t)] \)
Mult = 1/[1-(2/3)(1-0.25)]
Mult = 1/[1-(2/3)(0.75)]
Mult = 1/(1-0.5)
Mult = 1/0.5 = 2

But they don’t need to use the formula if they can read the answer from their first calculation.

(c) (3 points) Savings equals disposable income minus consumption:
\[
S = (Y – T) – C
\]
Some of these values are already calculated in (a). So:
\[
S = \{3600 – [180 + 0.25(3600)]\} – [380 + 0.5(3600)]
\]
\[
\]
\[
S = 3600 – 3260
\]
\[
S = 340
\]

(d) (3 points) Surplus = T – G
\[
\text{Surplus} = 180 + 0.25(3600) – 820
\]
\[
\text{Surplus} = 180 + 900 – 820 = 260
\]

(e) (4 points) (i) Since the multiplier is 2, when G rises by 200, Y will rise by 400, to 4000. Students can work out the calculation all over again, but it is not necessary.

(ii) At the new equilibrium, Surplus = T – G
\[
\text{Surplus} = 180 + 0.25(4000) – 1020
\]
\[
\text{Surplus} = 180 + 1000 – 1020 = 160
\]

(f) (2 points) Government spending rose by 200, but the deficit fell by only 100, since induced taxes rose by 100 (that is, one quarter of the increase in national income of 400).

3. (15 points total, 9 for part a and 6 for part b). I can’t draw diagrams on this program, so I will describe the correct diagrams.

(a) The diagram has Y on the horizontal axis and C and I on the vertical axis (and/or AD for aggregate demand). A line beginning at the origin slopes positively at an angle of 45 degrees. Draw an autonomous I line parallel to the horizontal axis. The C line has a positive intercept at the vertical axis and a slope greater than zero and less than one, so that it intercepts the 45 degree line at some point. The C + I, or AD, line is parallel to the C line, and above it by the amount of the investment function. Where it intercepts the 45 degree line, a vertical line should show equilibrium income on the horizontal axis. Where this vertical line intercept the consumption and investment functions shows, on the vertical axis, the levels of consumption and investment, respectively. Savings is the vertical distance between the consumption function and the 45 degree line, and thus at equilibrium is equal to investment. The marginal propensity to consume is the slope of either the consumption function or, in this case, the aggregate demand line.

(b) With a new diagram with higher investment, the levels of all the variables are shown in the same way. The multiplier is shown by the difference in equilibrium incomes (between parts a and b) as the numerator and the increase in investment, that is, the vertical distance between the two I lines (or the vertical distance between the two AD lines) as denominator.
4. (15 points: 3 for a, 3 for b, 5 for c, 4 for c) 
(a) The vertical axis is labeled P, the horizontal axis Y. Aggregate demand slopes negatively, aggregate supply positively. Their intersection shows the initial P and Y on the respective axes. 
(b) The new DD line is to the left of the original one. Show how at the new equilibrium both P and Y have fallen. 
(c) Show that at a lower P, the real wage (W/P) has risen. So eventually W, the money wage, will fall, shifting the aggregate supply curve out. If W falls by the same proportion as P, the vertical downward movement in SS will be such that it intersects a vertical line from the original equilibrium at the new price level. But this increase in supply in turn creates excess supply, so the process keeps repeating itself, with SS increasing until it intersects DD at the old output level. At this point, both output and real wages are unchanged from the starting point. 
(d) If the economy is to adjust back to its original starting point, both prices and wages have to be flexible in the downward direction. If they are not flexible, the economy will be stuck at the original multiplier reduction in income. If only prices, but not wages, are flexible, the economy will be stuck at its second equilibrium, with both lower prices and lower output. 

5. (12 points). There is a bit of a trick in this question. Although quantities for 2002 are shown, they are not needed in coming up with the answer. The market basket used in both years is the market basket in the base year, 2001. The price index is equal to the price of the market basket in 2002 divided by the price of the market basket in 2001, times 100: 

\[
\left[ \frac{(50 \times $11 + 100 \times $3)}{(50 \times $10 + 100 \times $2)} \right] \times 100 \\
= \left[ \frac{550 + 300}{500 + 200} \right] \times 100 \\
= \frac{850}{700} \times 100 \\
= 121
\]

6. (6 points) \( I + G + X = S + T + M \)

7. (13 points) Obviously there are no right or wrong answers to this question. Look for answers that are well argued, and that make appropriate use of economic concepts.
Economics 2, Winter 2001
Final Exam Answer Key

1. 15 points total. 5 points for part (a), 2 points each for the remaining parts. Penalize a student only once for a mistake. For example, if he miscalculates GDP in (a), deduct points for it, but if he then uses the miscalculated GDP in computing, say, tax revenue, don’t deduct again.

(a) \( Y = C + I + G + (X - M) \)
\[
C = 100 + 0.8(Y - T)
\]
\[
C = 100 + 0.8[Y - (100 + 0.25Y)]
\]
\[
C = 100 + 0.8(Y - 100 - 0.25Y)
\]
\[
C = 100 + 0.8(0.75Y - 100)
\]
\[
C = 100 + 0.6Y - 80
\]
\[
C = 20 + 0.6Y
\]
\[
Y = 20 + 0.6Y + 300 + 480 + 200 - 0.1Y
\]
\[
Y = 0.5Y + 1000
\]
\[
0.5Y = 1000
\]
\[
Y = \frac{1}{0.5}(1000)
\]
\[
Y = 2(1000) = 2000
\]

(b) Balance of trade = \( X - M = 200 - (0.1)(2000) = 200 - 200 = 0 \)

(c) Government surplus = \( T - G = (100 + 0.25Y) - 480 = 100 + 0.25(2000) - 480 = 100 + 500 - 480 = 120 \)

(d) To get this answer, you can do the whole calculation in (a) again, but it is not necessary. From (a), the multiplier is 2, and the marginal propensity to consume out of disposable income is 0.8. When taxes fall by 50, disposable income rises by 50, so consumption rises by 40, and this amount is multiplied by the multiplier, to give an increase in GDP of 80. So the new GDP is 2080.

(e) Government surplus = \( T - G = (50 + 0.25Y) - 480 = 50 + 0.25(2080) - 480 = 50 + 520 - 480 = 90 \)

(f) Autonomous taxes fell by 50 but the surplus fell by only 30, because the higher GDP led to an increase in autonomous taxes of 20.

2. 12 points total. 2 for (a), 4 for (b) and 6 for (c).

(a) Draw an aggregate supply and demand diagram, \( SS_0 \) sloping positively and \( DD_0 \) sloping negatively. Horizontal axis is \( Y \), vertical axis is \( P \). Initial equilibrium is at full-employment output (say, \( Y_f \)) and initial price level \( P_0 \).
(b) New aggregate demand curve, DD\(_1\), lies to the left of and below DD\(_0\). New intersection with SS\(_0\) shows a lower price level, P\(_1\), and a lower output, Y\(_1\).

(c) With a lower price level, real wages (W/P) have risen, this in spite of the fact that unemployment has also risen. Thus employers will be in a good position to lower money wages, the next time negotiations occur, in order to restore the original real wage. This reduction in money wages is itself an improvement in aggregate supply, so draw a new SS\(_1\), to the right of the old one. [Deduct a point if students call this a reduction in supply, rather than an increase.] As a result of the newly expanded supply, we will again have excess supply, so prices will fall and the process will continue, until the fall in wages exactly matches the fall in prices. Draw a new SS\(_2\), intersecting DD\(_1\) directly below the original intersection. At this point the original real wage has been restored, and supply equals demand, so there will be no further changes. Real output has returned to its original level, and prices have fallen.

3. 19 points: 5 each for parts (a), (b), and (c), and 4 for (d).

(a) Consumption will rise because the cut in taxes will increase disposable income. Consumption will rise by somewhat less than the tax cut, namely by the marginal propensity to consume times the increase in disposable income. Eventually, consumption MAY rise by more than this, if the net effect of the tax cut is to stimulate the economy. Look ahead at part (d), and see if the student is predicting an increase in GDP. If so, there will be further increases in C, as incomes rise and the MPC does its work. If, however, the student does not predict an increase in GDP, then the increase in C is restricted to just the tax cut times the MPC.

(b) Draw a supply and demand of money diagram, with interest on the vertical axis. To the extent that the tax cut stimulates GDP, the transactions demand for money will rise, and the demand curve for money will shift to the right. Alternatively, think of the government deficit rising (or surplus falling), so that the government itself demands more money. Either way, the demand for money rises and, with a fixed supply of money, interest rates rise. Next show a diagram with demand for investment relative to the interest rate. As interest rates rise, investment falls. So the tax cut will probably lead to less investment. If students say investment will fall, but give a different reason, award part marks, depending on the reason.

(c) We have already established in (b) that interest rates will rise. This will attract short term foreign investment into the country. This in turn increases the demand for the dollar. Students may draw a supply and demand curve for the U.S. dollar, with the exchange rate (say, yen per dollar) on the vertical axis. The capital flows increase the demand for the dollar, and hence increase the equilibrium exchange rate. This increase in the exchange rate in turn makes our exports more expensive to foreigners, and makes imports seem cheaper to Americans. So exports probably fall and imports rise, thus lowering net exports. Alternatively, or in addition, if the students predict an increase in GDP in (d) below, they could argue that rising national income will raise
imports, and thus lower net exports. But if GDP doesn’t rise, this second mechanism
does not come into effect.

(d) The net result of (a) through (c) is uncertain. The tax cut raises consumption but
lowers both investment and net exports. The ultimate effect on GDP depends on the
relative magnitude of these effects. The initial increase in C could outweigh the other
two effects, in which case the tax cut would stimulate the economy, at least to a
certain extent. But it is quite possible that the negative effects on investment and net
exports could completely cancel the expansive effects on consumption, leaving GDP
unaffected. It is even possible that the net effect could be negative, although this is
unlikely. So award marks in this section depending upon the reasons given.

4. 12 points total, 3 points for each part. For each part, draw a supply and demand curve
for the U.S. dollar, with some exchange rate (say, francs per dollar) on the vertical
axis (or, alternatively as the text does, the supply and demand of a foreign currency,
with dollars per pound, say, on the vertical axis.)

(a) If foreigners buy more U.S. goods, the demand for the dollar rises, and the exchange
rate rises.
(b) If foreigners invest less money in U.S. assets, the demand for the dollar falls, and the
exchange rate falls.
(c) If immigrants increase their remittances, the supply of the dollar rises, and the
exchange rate falls.
(d) If the U.S. imposes a tariff on imports, the supply curve shifts up by the amount of the
tariff, and the exchange rate rises.

5. 20 points. 3 points for each part except (b), which has 2 points.

(a) With a reserve ratio of 0.2, the additional reserves created by the Fed will lead to a 5-
fold increase in the money supply. To increase the money supply by 200B, it must
increase reserves by 40B. Therefore it will purchase securities worth 40B. This action
by itself raises the money supply by 40B.

(b) Fed

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonds: + 40B</td>
<td>Notes, or a check: 40B</td>
</tr>
</tbody>
</table>

Money supply still is up by $40B.

(c) Wells Fargo

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves: + 40B</td>
<td>Deposit: + 40B</td>
</tr>
</tbody>
</table>
No effect on the money supply; it still stands at 40B, now in the form of a deposit at Wells Fargo. [Students may assume (as the text does) that the Fed buys the bond directly from Wells Fargo, even though this is contrary to what the question says. If so: no change in liabilities, and the asset side shows reserves + 40 and bonds –40.]

(d)
Wells Fargo now has increased required reserves of 8B (0.2 times 40B), and therefore it has excess reserves of 32B. It therefore lends out 32B. Now its balance sheet looks like this:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves: + 8B</td>
<td>Deposit: + 40B</td>
</tr>
<tr>
<td>Loans: + 32B</td>
<td></td>
</tr>
</tbody>
</table>

Now the money supply has risen by 72B, consisting of the 40B in Wells Fargo deposits, plus the 32B lent to the new borrower.

(e) Entire Banking System

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves: + 40B</td>
<td>Deposit: + 200B</td>
</tr>
<tr>
<td>Loans: + 160B</td>
<td></td>
</tr>
</tbody>
</table>

Now the money supply has risen by 200B, all of it consisting of deposit accounts at commercial banks.

(f) Draw a supply and demand of money diagram, with interest on the vertical axis. The increase in money is represented by a new supply curve to the right of the old. Interest rates fall. Draw a demand for investment diagram, with interest rates on the vertical axis. With a lower interest rate, investment rises.

(g) Draw a Keynesian cross diagram, with Y on the horizontal axis, expenditure on the vertical, and a 45-degree line bisecting the right angle at the origin. Autonomous expenditure (say, I and G) is shown by a horizontal line, consumption as a positively sloped line, slope less than 1. The expenditure line is the sum of the two, with a slope equal to the slope of the consumption function. Where it intersects the 45-degree line is equilibrium GDP. The increase in investment raises the autonomous spending line and hence also the total expenditure line vertically by the amount of the increase. This leads to a new intersection with the 45 degree line and a new equilibrium GDP. The increase in GDP should be greater than the increase in investment that caused it, indicating the multiplier effect.

6. 6 points total. 2 for each part.

(a) Quantity equation: $MV = PY$. There are other correct formulations, for example, $MV = PT$, or $M = kPY$. 
(b) Velocity of money is how many times each year each dollar turns over in the purchase of GDP (or, in the case of $MV = PT$, in any transaction). It is measured: $V = \frac{(PY)}{M}$.

(c) A change in money will lead to an equal proportionate change in GDP if velocity is constant.

7. 16 points total, 8 for each question. There are, of course, no “correct” answers to these discussion questions. Look instead for precise, clear, logical arguments that make appropriate use of economic concepts and that make a strong case for their point of view.
What follows is, I hope, a set of correct answers, but these may not be the only correct answers. People marking the exam will have to use their own judgment.

1. 10 points total, 1 for each correct answer.
   (a) Phillips Curve. A diagram with unemployment on the horizontal axis and inflation on the vertical axis. The negatively sloped Phillips Curve shows the trade-off between unemployment and inflation. (also correct if students say that the vertical axis is the rate of change of money wages.
   (b) Supply-side tax cuts. The idea that tax cuts will have their main economic impact on aggregate supply, rather than aggregate demand: by providing funds for investment that will increase the capital stock, and by creating stronger incentives to work effectively.
   (c) Consumer price index. A weighted average of consumer prices changing over time, the weights being proportional to the expenditure in the market basket of the base year.
   (d) Autonomous spending. Expenditure on GDP which is not induced by income.
   (e) Fiscal policy. Decisions by the government with respect to taxation and expenditures.
   (f) Floating exchange rate. The rate of exchange between two national currencies which is set in the free market, without government interference.
   (g) Balance of payments. A set of accounts showing the sales and purchases of the national currency in foreign transactions.
   (h) Stagflation. When unemployment and inflation increase at the same time.
   (i) Quantity theory of money. Based on the equation MV=PY, the quantity theory states that V, the velocity of money, is roughly constant, so that changes in money income, PY are proportional to changes in M, the money supply.
   (j) Disposable income. Personal income minus personal taxes; that is, the income over which a person has a choice as to how to allocate.

2. 18 points total: 5 for (a), 1 for (b) and 2 each for the remaining parts of the question. Don’t keep deducting points for the same mistake. For example, if the student gets the multiplier wrong in (a) mark the remaining questions as if she had gotten the right answer.
   (a) \[ Y = C + I + G + (X – M) \]
   \[ C = 100 + 0.75(Y – T) \]
   \[ T = 40 + 0.2Y \]
   \[ C = 100 + 0.75(Y – (40 + 0.2Y)) \]
   \[ C = 100 + 0.75(0.8Y – 40) \]
   \[ C = 100 + 0.6Y –30 \]
   \[ C = 70 + 0.6Y \]
   \[ Y = 70 + 0.6Y + 300 + 400 + 200 – 0.1Y \]
   \[ Y = 0.5Y + 970 \]
   \[ 0.5Y = 970 \]
   \[ Y = (1/0.5)970 \]
   \[ Y = 2(970) \]
Y = 1,940

(b) The multiplier is 2, as seen in the second to last line of the calculations in (a). Alternatively, students can work out the formula, in which the multiplier is
\[ \frac{1}{b[1-t] + m} \]
where b is 0.75, t is 0.2 and m is 0.1.

(c) Since the multiplier is 2, when autonomous government spending rises by 20, the equilibrium GDP rises by 40, to 1,980.

(d) Since the marginal propensity to consume is 0.75, when autonomous taxes fall by 20, consumption rises by 15. This increase in 15 is multiplied by the multiplier (2) to reach a new equilibrium GDP of 1970.

(e) Even though the increase in G and the tax cut are the same, the former is more powerful in increasing GDP, since only a portion (b, or the marginal propensity to consume) of the latter is spent on GDP.

(f) Government surplus = T – G. T = 40 + 0.2Y = 40 + 0.2(1,940) = 40 + 388 = 428. G = 400. So the surplus = 428 – 400 = 28

(g) Trade surplus = X – M. X = 200. M = 0.1(1,940) = 194. So the trade surplus = 200 – 194 = 6.

(h) S + T + M = I + G + X. Therefore S = I + (G – T) + (X – M). Using the results of (f) and (g) above, S = 300 - 28 + 6 = 278.

3. 8 points total: 4 for each part. I can’t draw the graphs on this word processing program, so I will describe them. But the students should draw them.

(a) The Keynesian cross diagram should be properly labeled: Y on the horizontal axis and AD, or C + I, or C + I + G on the vertical. I line is horizontal. C line is positively sloped, with a positive intercept on the vertical axis and a slope less than one, so that it intersects the 45 degree line. The aggregate demand line has the slope of the consumption function, and lies above the latter by the amount of investment. (If students add a horizontal G line, then AD is the vertical sum of C, I and G). Equilibrium output is shown on the horizontal axis, directly below the intersection of AD with the 45 degree line. I is shown by the I line. C is shown by the level of the consumption function, directly below the intersection of AD and the 45 degree line.

(b) The income tax rate increase yields a consumption function with the same intercept on the vertical axis as the original consumption function, but a lower slope. As a consequence, the slope of the new AD line is lower as well. The new equilibrium levels of C and Y are found as above.

4. 12 points total, 4 for each part.

(a) Label the aggregate supply and demand diagram accurately, with Y on the horizontal axis and P on the vertical. DD slopes negatively and SS positively, with an intersection at the initial Y and P. Call this intersection, say, A. Now let aggregate demand increase, yielding a new equilibrium, up along the original supply curve at, say, B. At this point, both Y and P have risen. Now the real wage, W/P, has fallen (because P has risen), so workers attempt to raise the money wage, W. If this happens, it is represented by a backward movement of the aggregate supply curve. Depending on the shift in SS, this will lead again to excess demand, and a further rise in P, and so forth, until the SS line has shifted back so much that it intersects the new DD curve at the old output level, Y. Call this intersection C. If the economy starts at A, and then in response to an increase in aggregate demand, ends up at C, we may say that the long-run aggregate supply curve is vertical.

(b) The diagram shows M, money, on the horizontal axis, and i, the interest rate, on the vertical axis. The supply of money is vertical, or only slightly positive, while the
demand for money is negatively sloped. Inflation (that is, a movement up along the vertical axis of the aggregate supply and demand curve) increases the transactions demand for money, shifting the D line in the money diagram to the right. With no increase in the money supply, this leads to a higher interest rate. This higher interest rate leads in turn to a lower level of investment (and perhaps also, in a regime of floating exchange rates, to capital inflows, an appreciation of the dollar and a consequent decline in exports). The decline in investment (and perhaps also in exports) has a multiplied negative effect on GDP. Therefore, as the aggregate demand curve shows, a higher price level is associated with a lower GDP.

(c) Back to the aggregate supply and demand diagram from part (a). Falling world oil prices lower the costs of production, and hence can be represented by an increase in aggregate supply. The aggregate supply curve shifts right, giving us a new equilibrium at a higher output level and lower prices (or at least lower inflation).

5. 6 points: 3 each for the two parts.
(a) The transactions demand for money is influenced mostly by the level of national income. People get paid at different times from when they spend their money, so they usually hold some money, in order to make expenditures some time in the future, before they next get paid. The higher the level of national income, the more their total expenditures, so the more money they will want to hold, in anticipation of those expenditures.

(b) The asset demand for money is influenced by the interest rate, which is the opportunity cost of holding money. Money is a liquid, and therefore desirable, way of holding assets, but the cost of holding assets in the form of money is that one gives up the interest that could be earned if the assets were invested. The higher the interest rate, the higher this cost, so the less money will be held for asset purposes.

6. 12 points: 4 for each part.
(a) Probably use two diagrams here, the first the supply and demand of money, the second the demand for investment. Both have the interest rate on the vertical axis. A tax cut increases the demand for money (think of this either as the government increasing its borrowing, or as the transactions demand for money rising because of the stimulating effect of the tax cut). This leads to a higher interest rate. On the second diagram, this leads to a reduction in investment.. So the tax cut, which stimulates C, is at least partially crowded out by a reduction in I.

(b) As before, the tax cut increases the demand for money and hence raises the interest rate. As a second diagram, draw the supply and demand of the dollar in international exchange. The increase in the interest rate leads to capital inflows, which in turn increase the demand for the dollar. On the diagram, shift the demand curve to the right. The excess demand for the dollar leads to an increase in the equilibrium exchange rate. The movement back up along the new demand curve is a representation of the decline in exports, caused by the increase in the value of the dollar.

(c) Students may argue that fiscal policy is completely crowded out, by the decline in I and X, or they may argue that the crowding out is only partial.
7. 12 points: 4 for each part. In each case, draw a supply and demand curve for the dollar in foreign exchange, with the dollar on the horizontal axis and the exchange rate (foreign currency per dollar) on the vertical. If students choose to do it the way the book does it, then the foreign currency is on the horizontal axis, and dollars per foreign currency on the vertical.

(a) Americans increase their investment in foreign companies. This is a capital outflow, or a decline in capital inflow. Thus it can be represented either by an increase in supply or a reduction in demand (or both). In any case, the exchange rate falls.

(b) Foreigners reduce their purchases of American computers. Therefore our exports fall, and the demand for the dollar falls (moves to the left). The new equilibrium shows a lower exchange rate.

(c) If the US economy goes into a steep decline, the demand for imports declines, and hence the aggregate supply curve shifts left. This in turn raises the value of the dollar.

8. 12 points.

If the Fed wishes to raise GDP by 1,000, and the multiplier for increases in autonomous spending is 2, it must stimulate new spending of 500 (which in turn will be multiplied by 2). If spending rises by 250 for each one percentage point drop in interest rates, it must find a way to push interest rates down by 2 points. If rates fall by 1 point for each increase in the money supply of 50, it must increase the money supply by 100. To do this, it must find a way to increase the reserves of the commercial banks by 20 since, with a 20 percent reserve ratio, this will allow the banks to increase their deposits by 100 when they are fully loaned out (and remember that the deposit liabilities of the commercial banks are part of the money supply). If the Fed is going to use open market operations to do this, it must buy $20 in government securities.

9. 10 points. The idea here is to look for coherent arguments; there are no “correct” arguments.