14.02 Principles of Macroeconomics
Problem Set 1
Spring 2003

Posted Wednesday, February 19.
Due Wednesday February 26 in class.

PLEASE FILL IN THE BLANKS BELOW AND ATTACH THIS COVER SHEET TO THE FRONT OF YOUR COMPLETED PROBLEM SET.

YOU WILL BE AUTOMATICALLY REGISTERED IN THE SECTION/RECITATION YOU INDICATE BELOW. THEREAFTER, YOU CAN CHANGE RECITATIONS/SECTIONS ONLY WITH FACULTY APPROVAL.

NAME: _____

MIT ID NUMBER: _____

TA: _____

CLASS TIME: _____

Question 1: Short answer

Answer true or false to each of the following statements, and briefly (one paragraph) explain your reasoning:

(a) A standard goods market model (eg. Chapter 3) predicts that, if the government cuts taxes but also cuts government spending by the same amount, the equilibrium level of GDP will fall.

(b) Since rich people generally live in large houses, eat expensive meals etc., it is logical to conclude that they generally have a higher marginal propensity to consume than poorer people.

(c) When measuring GDP, you must include the salary the government pays to a currently employed Navy officer.

(d) When measuring GDP, you must include the pension the government pays to a retired Navy officer.

(e) If the central bank buys government bonds from the general public in an open market operation, interest rates should fall.

(f) Imports can be larger than GDP.

(g) The growth rate of nominal GDP per capita is the best summary measure of changes in material living standards in a country over time.

Question 2: Understanding Economic Data

(based on the material in Chapter 2 of Blanchard)

I. NATIONAL ACCOUNTS

Consider a very simple economy where there are only three firms, and only one good is produced – baseball bats.

Nomar Inc. is a lumber company, and cuts the trees used to provide wood for the bats. Over the past year, Nomar Inc. cut down and sold $120 of lumber, and paid its timbercutters $70 in wages.

Nomar Inc. sold its lumber to Manny Inc., which used the wood to manufacture the baseball bats. As well as paying for the raw lumber, Manny Inc. paid its manufacturing workers $80 over the year.

Manny Inc. used all the wood it purchased, and sold all the bats it produced to the retailer Pedro Inc. for $300. Pedro Inc. on-sold the bats to the general public for $500. Out of this $500, Pedro Inc also paid its salespersons $70 in wages, and paid indirect taxes (eg. sales tax) of $40 to the government.

(a) Calculate the revenues, expenses and profits for each of the three firms.

(b) What is the GDP of this economy? Calculate your answer in at least two different ways, and check that the answers are the same!

(c) Calculate the shares of GDP attributable to labor income, capital income and indirect taxes. Are these income shares similar to the income shares of labor income, capital income and indirect taxes in the US economy?

II: UNEMPLOYMENT

Consider the following labor force statistics for an economy.

Total population (000s):	1 000
Number of adults employed (000s):	600
Number of adults unemployed and looking for work (000s):	50
Number of adults unemployed and not looking for work (000s):	100
Number of elderly and children [none of whom work or look for work] (000s):	250

(d) Calculate the unemployment rate for this economy.

There is an economic boom, and 20 000 new jobs are created, all of which are filled by adults who were previously unemployed but looking for work.

(e) Calculate the new unemployment rate.

Now the stock market crashes, and the boom turns into a deep recession. Total employment falls to 520 000. All the laid off workers give up hope of finding another job, and decide to retire and move to Florida. So the number of people unemployed but looking for work remains at 30 000 as in Part (e).

(f) What is the new unemployment rate? Compare your answer to the answers you found in parts (d) and (e). Thinking about this comparison, comment on the strengths and weaknesses of the unemployment rate as a measure of the strength of the labor market.

III: NOMINAL AND REAL DATA

Consider the following data on nominal GDP and prices.

	Nominal GDP	Price level
1996	260	100
1997	279	103
1998	299	107
1999	342	115
2000	379	122
2001	388	125

(g) Calculate the inflation rate between each of the years in the above table.

(h) Calculate real GDP in each year in terms of 1996 dollars.

(i) Calculate the growth rate in nominal GDP between each of the years. Calculate the growth rate in real GDP between each of the years. Which growth rate is generally higher? Why? Which growth rate is a more informative measure of economic performance?

(j) Suppose you found out that the unemployment rate increased sharply in 2001 to a 20 year high. Would this fact surprise you, given the inflation rates you calculated in part (g)? [HINT: Think of the Phillips curve relation]. Is it consistent with the growth rates for GDP you calculated in part (i)? [HINT: Think of the Okun's law relation].

Question 3: The Goods Market

(based on the material in Chapter 3 of Blanchard)

Consider the following simplified model of an economy:

$$C = 3 + 0.9(Y - T)$$
$$I = 6$$
$$G = 11 - 0.01Y$$
$$T = 0.1Y$$
$$Z \equiv C + I + G$$
$$Y = Z$$

This is similar to the models you have seen in class, except that government spending, instead of being constant, is `counter-cyclical', that is, it is a negative function of output Y, and tax is `pro-cyclical', that is, it is a positive function of Y.

(a) Why in the real world, might you expect taxation revenues to decrease when Y is decreasing, and government spending to increase when Y is increasing? Give a couple of specific examples if you can.

(b) Solve for the equilibrium level of income, Y, in this economy. Calculate the government's budget balance (T-G).
[HINT: You should get nice round numbers for both these answers. If you don't, then you should recheck your algebra].

The rest of this question considers the effects of a decline in investment (I) from 6 to 4.

(c) Calculate how much Y decreases following the decline in I. Calculate the new budget balance (T-G).

(d) Does Y fall by more or less than I? Give an intuitive (non-mathematical) explanation why. Now show graphically what happens when I falls, using a goods market diagram like the ones in Chapter 3 of the textbook.

(e) Since T = 0.1Y, the income tax rate is therefore 10%. Calculate how much the government would have to lower the income tax rate in order to return Y to its original level (the level you calculated in part (a)) following the fall in investment from 6 to 4.

(f) For this part, we're going to think about the effects of the decline in investment assuming the government has a balanced budget rule. A balanced budget rule means that, when any of the parameters in the model change, government spending always adjusts so that G = T. In other words, replace the old equation describing government spending (G = 11 – 0.01 Y) with a new equation, G = T.

- As you did in part (a), calculate the equilibrium level of Y, and the budget balance (T – G), assuming that I = 6.
- Now calculate the new level of Y following a decline in investment from 6 to 4. Compare your answer to the answer you came up with in part (b). Is it higher or lower? Why?

(g) Many states in the United States (e.g. Texas) have passed legislation which forces the state government to cut spending following a decline in tax revenues, to keep the state budget from falling into deficit.

- Based on your analysis in the rest of this question, do you think this kind of legislation is a good idea?
- Apart from the factors considered in this model, can you think of any other reasons why such legislation might be a good or bad idea?

Be brief (2 paragraphs or so). You don't have to do any algebra in this part of the question (you might want to refer to previous calculations you made, though!)

Question 4: Financial innovation

(based on the material in Chapter 4 of Blanchard)

Consider Bert, a middle-aged family man who lives in the outer suburbs of Boston during the 1970s. Bob spends $10 during the course of each day, and always pays in cash. It is difficult for him to get to a bank during office hours, so he only visits a bank once a week (right before he goes home to bed), withdrawing all the money he needs for the coming seven days.

(a) What is the average amount of money Bert has in his wallet at the end of each day? In other words, what is his average `money demand'?

Now it is the 1980s, and an ATM has been built at Bert's bank, which means he can withdraw funds at night-time. Now Bert stops by the bank every three days, withdrawing all the funds he needs until the next time he goes to the bank. (Bert still spends exactly $10 every day).

(b) Calculate Bert's new average money demand.

Now it is the 2000s. Credit cards are commonly accepted, and point-of-sale debit bank transfers are also very common. So Bert rarely pays in cash, and just keeps $5 in his wallet for emergencies (which, because Bert is so careful, never arise).

(c) Draw a labeled graph of how Bert's money demand has changed over time. If everyone in the economy had a similar experience to Bert in terms of their demand for money, what would have happened to the **velocity of money** in this economy? Would such a trend be consistent with recent experience in the United States?