Name: _____Solutions_____

Cosumnes River College
Principles of Macroeconomics
Problem Set 3
Due March 1, 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. Use the information on the Macrovian economy given in the table below to answer the following questions. (Assume there is no statistical discrepancy between the expenditure and incomes approach.)

Business Fixed Investment	586.1
Inventory Investment	-30.9
Compensation of Employees	5,178.6
Corporate Taxes	215.9
Macrovian Exports of Goods and Services	380.4
Depreciation	643.5
Personal Taxes	600.0
Personal Consumption Expenditures	3,514.8
Government Purchases of Goods and Services	1,589.7
Indirect Business Taxes minus Subsidies	489.6
Net Factor Payments to the Rest of the World	-17.3
Residential Construction	453.7
Corporate Profits minus Dividends	45.7
Government Transfer Payments and Interest	337.1
Macrovian Imports of Goods and Services	285.0
Social Insurance Payments	441.7

a. Calculate gross private domestic investment.

Business Fixed Investment+ Inventory Investment+ Residential Construction
= 586.1 - 30.9 + 453.7 = 1008.9

b. Calculate Macrovian GDP

GDP = C + I + G +(X – M) = 3,514.8 + 1008.9 + 1,589.7 +(380.4 – 285) = 6,208.8

c. Calculate Gross National Product
GNP = GDP - Net Factor Payments to the Rest of the World = 6,208.8 – (-17.3) = 6,226.1

d. Calculate Net National Product
NNP = GNP – Depreciation = 6,226.1 – 643.5 = 5,582.6

e. Calculate National Income
National Income = GDP – (Depreciation + Indirect Business Taxes minis Subsidies) – Net Factor Payments to the Rest of the World
= GNP - (Depreciation + Indirect Business Taxes minis Subsidies)
= 6,226.1 - (643.5 +489.6) = 5,093.0

2. Assume that you are given GDP and depreciation data for 1998. Explain why this is not enough information to calculate Net National Product.

   In order to calculate Net National Product you must first have Gross National Product figures. Since the net factor payments to the rest of the world are not given it is impossible to calculate NNP with the available information alone.

3. Assume that GDP is $9 Trillion, receipts of factor income from the rest of the world are $2 Trillion, and payments of factor income to the rest of the world are $1 Trillion. Calculate GNP from this information.

   GNP = GDP +factor payments from the rest of the world - factor payments to the rest of the world.

   Therefore GNP = $9 trillion + $2 Trillion - $1 Trillion = $10 trillion.

4. Explain why real GDP may fall even when the prices of large number of goods in the economy have increased enormously.

   Real GDP is a measurement of the actual physical quantity of goods and services produced in an economy. Just because the price of these services has risen does not necessarily mean that there has been increased production of these goods.

5. If NNP is $7 trillion, net investment is $500 billion and gross investment is $1 trillion determine the level of GNP.

   GNP = NNP + depreciation; depreciation = gross investment - net investment ($1 trillion - $500 billion) Therefore GNP = $7 trillion + $500 billion = $7.5 trillion.

6. You are given the following data for a hypothetical economy:

Category	Number (in millions)
Individuals 16 or older	242.6
Employed	124.8
Unemployed	18.2

   a. What is the size of the labor force?

      LF = 124.8 + 18.2 = 143 million

   b. Calculate the labor force participation rate.

      LFP = 143/242.6 x 100 = 58.94%

   c. Calculate the unemployment rate.

      U = (18.2/143) x 100 = 12.73%

7. List and explain the three major types of unemployment.
   Structural Unemployment is unemployment resulting from structural change and technological advance in the economy. The jobs are gone and not coming back.

   Frictional unemployment is due to the normal functioning of the labor market. Those entering the labor market to look for jobs or those changing jobs are frictionally unemployed.

   Cyclical unemployment is unemployment resulting from the business cycle. When actual output falls below potential output, cyclical unemployment results as firm lay off workers.

8. Which of the following people would be unemployed according to the official statistics? Why?
   a. A person who is writing a book at home while seeking a permanent position on a newspaper
      They will be classified as unemployed so long as they are not being paid to write the book and have been actively looking for work in the previous four weeks.

   b. A full-time student who would like a job but has turned down several job offers because they didn't fit her schedule
      Not in the labor force because they are not willing to accept offered work.
   c. A recent college graduate who is looking for a job
      In the labor force and unemployed, so long as they have looked for work within the last four weeks.

   d. A person who just wants to sit in front of the television all day
      Not in the labor force

   e. A worker who quits his job because he thinks the pay is too low
      Unemployed, so long as they are actively looking for a new job and have done so within the last four weeks.

   f. A teenager who gets discouraged and quits looking for work
      Not in the labor force

9. Suppose that in 2003 the U.S. economy is in "normal" times and the unemployment rate is 6 percent.
   a. If the working age population is 205 million and the total labor force participation is 135 million, how many people are considered unemployed?

      135 x .06 = 8.1 million

   b. What is the labor force participation rate in 2003?

      135/205 = 65.8%

10. For each of the following events, explain what is likely to happen to the labor force participation rate:
    a. The federal minimum wage is raised to $12.50 per hour.

       The labor force participation rate will likely increase as more people enter the labor force to look for work.

    b. The minimum legal working age is raised from 16 to 18.

       The labor force participation rate will likely decline as this age group would now be excluded. Note that this question could be more complicated though. If we also redefine the working age population to include only those 18 and over, then LFP might actually rise, depending on the previous LFP of 16 and 17 year olds.

    c. The economy is in the midst of a prolonged recession.
       The labor force participation rate will likely decline as unemployed workers become discouraged and leave the labor force.

    d. The federal government imposes a legal maximum retirement age of 65.
       The labor force participation rate will decline because those 65 and older will be forced out of the labor force.

    e. The federal government increases the minimum age requirement for collecting social security.
       This will force people to work longer and will increase the labor force participation rate.

11. Answer each of the following:
    a. Jake retired from the police force. He started working an hour or two a day at a paid job in city's courthouse. Is Jake considered employed and therefore part of the labor force? Explain.
       Yes, he is employed because he is working one hour or more per week for pay.

    b. The number of people classified as employed is 260,000 and the number of people classified as unemployed is 30,000. Calculate the unemployment rate.

       U=[30,000/(260,000+30,000)] x 100 = 10.35%

    c. If the number of people employed is 150,000 and the labor force is 170,000, what is the unemployment rate?

       U=[(170,000-150,000)/170,000] x 100 = 11.76%

    d. If the unemployment rate is 6.2% and the number of people employed is 200,000, what is the approximate number of people who are unemployed?

       This is just an algebra problem. Most of the steps are shown below:

$$6.2 = \frac{U}{200000 + U} x100$$

$$\frac{6.2}{100} = \frac{U}{200000 + U}$$

$$0.062(200000 + U) = U$$

$$12400 = U - 0.062U$$

$$12400 = 0.938U$$

$$U \approx 13220$$

e. If the number of unemployed equals 30,000, the number of employed equals 60,000, and the number not in the labor force is 10,000, what is the labor-force participation rate?

$$LFP = \frac{30000 + 60000}{30000 + 60000 + 10000} x100 = 90\%$$

f. What would be the effect on the unemployment rate of classifying discouraged workers as unemployed?
It would increase the unemployment rate.

g. What is the natural rate of unemployment?
The natural unemployment rate is the sum of structural and frictional unemployment. Alternatively, it is the unemployment rate that would prevail if frictional unemployment were zero or the unemployment rate that would prevail if resources were fully and normally employed and we were producing our potential output.

12. Compute real wages (that is money wages deflated by the price index) in each year from the following data:

Year	Average Money Wage (dollars per hour)	Price Index (1982 = 100)	*Real Wage*
1966	2.56	33.6	*2.56/33.6 x 100 = $7.62*
1976	4.86	59.0	*$8.24*
1986	8.76	112.2	*$7.81*
1996	11.81	159.0	*$7.43*

What do you conclude?

Even though nominal wages increase over the whole time period, real wages increase only from 1966 to 1976 after which, due to inflation, they decline.

13. a. For each of the following situations calculate the actual (*ex post)* real interest rate and state whether you would rather be a lender or a borrower in the given situation:
   i. The nominal interest rate is 14 percent, the inflation rate is 17 percent and the expected (*ex ante*) real interest rate is 3 percent.

   r = 14% - 17% = - 3%
   borrower, because the actual real interest rate is far less than expected

   ii. The nominal interest rate is 7 percent, the inflation rate is 3 percent and the expected (*ex ante*) real interest rate is 5 percent.

   r = 7% - 3% = 4%
   borrower, because the actual real interest rate is less than expected

   iii. The nominal interest rate is 4 percent, the inflation rate is -2 percent and the expected (*ex ante*) real interest rate is 3%

   r = 4% -(-2%) = 6%
   lender, because the actual real interest rate is greater than expected

iv. The nominal interest rate is 6 percent, the inflation rate is 2 percent and the expected (*ex ante*) real interest rate is 3%

r = 6% - 2% = 4%
lender, because the actual real interest rate is greater than expected

b. i. If you are a lender, of the four above scenarios which would you prefer? Why?
Scenario iii, because this yields the highest real interest rate

ii. If you are a borrower, of the four above scenarios which would you prefer? Why?
Scenario i, because this yields the lowest real interest rate

14. There are three goods consumed in Adrenaland: fast cars, parachute jumps and hang gliders. The prices and quantities for each in 2009 and 2010 are given below. The market basket comprises the 2009 quantities.

	2009		2010
Goods	**Prices**	**Quantities**	**Prices**
Fast Cars	$20,000	1	$30,000
Parachute Jumps	$100	365	$80
Hang Gliders	$500	3	$800

a. Calculate the Adrenaland consumer price index for 2009 and 2010 using 2009 as the base year.
CPI_{2009} = {[(1 x $20,000) + (365 x $100) + (3 x $500)]/ [(1 x $20,000) + (365 x $100) + (3 x $500)]/} x 100 =100

CPI_{2010} = {[(1 x $30,000) + (365 x $80) + (3 x $800)]/ [(1 x $20,000) + (365 x $100) + (3 x $500)]/} x 100 = (61,600/58,000) x 100 = 106.2

b. Calculate the inflation rate
π = [(106.2 – 100)/100] x 100 = 6.2%

15. You are given the following data:

		Price per Unit in			
	Units Purchased	**2009**	**2010**	**2011**	**2012**
Blueberries	8	$2.00	$2.00	$2.10	$2.40
Pineapples	5	$2.00	$2.50	$2.50	$3.00
Cheese	3	$2.50	$3.00	$3.50	$4.00

a. If 2010 is the base year, what is the value of the price index in 2009?
Cost of Market Basket in 2010 (base year)
C_{2010} = (8 x $2.00) + (5 x $2.50) + (3 x $3.00) = $37.5
Cost of Market Basket in 2009
C_{2009} = (8 x $2.00) + (5 x $2.00) + (3 x $2.5) = $33.5

CPI_{2009} = 33.5/37.5 x 100 = 89.33

b. What is the inflation rate from 2009 to 2010?

π = [(100 – 89.33)/89.33] x 100 = 11.94%

c. If 2010 is the base year, what is the value of the price index in 2012?
Cost of Market Basket in 2012
C_{2012} = (8 x $2.40) + (5 x $3.00) + (3 x $4.00) = $46.20

CPI_{2012} = 46.2/37.5 x 100 = 123.2

d. What is the inflation rate from 2011 to 2012?
To solve this you must first calculate the CPI for 2011.
Cost of Market Basket in 2011
C_{2011} = (8 x $2.10) + (5 x $2.50) + (3 x $3.50) = $39.80

CPI_{2011} = 39.8/37.5 x 100 = 106.13

π = [(123.2 – 106.13)/106.13] x 100 = 16.08%

16. If the CPI in 2011 was 114.7 and the CPI in 2012 was 124.5, what was the rate of inflation between 2011 and 2012?

π = [(124.5 – 114.7)/114.7] x 100 = 8.54%

17. If 2011 is the base year and the inflation rate between 2011 and 2012 is -4.5, what is the value of the price index in 2012?

-4.5 = [(CPI_{2012} – 100)/100] x 100
The highlighted terms above cancel, leaving
-4.5 + 100 =95.5

18. Dean borrows $400 from Tim. Tim wants to make a 10% real return on his money, so they both agree on a 10% interest rate paid next year. Dean and Tim did not anticipate any inflation, yet the actual inflation turned out to be 4% next year. Is Tim happy? What about Dean? Explain.

Tim is unhappy, because he only earns a real return of 6% instead of the expected 10%. Dean, on the other hand, is very happy because he pays a real rate of 6% instead of the expected 10%.