Homework will be graded for both content and neatness. Sloppy or illegible work will not receive full credit. This homework requires the use of Microsoft Excel.

1) Assume that the economy is composed of three firms: Albert's furniture (Firm A), Brian's lumber yard (Firm B), and Carl's timber harvesting (Firm C). As their names suggest, Firm B purchases timber from Firm C to produce lumber, which is then used by Firm A to produce furniture. Albert directly sells his furniture to consumers. Therefore, only Firm A is producing a final good. Assume that all intermediate goods are used in the production final goods.

	Firm A	Firm B	Firm C
Sales	$7,000	$3,000	$2,000
Raw Materials			
Wages	$1,500	$250	$1,130
Interest Payments	$750	$50	$300
Rent	$1,250	$600	$210
Profit	$500	$100	$360
Factor Expenditures			
Value Added			

Factor of Production	Factor Payment
Labor	Wages
Capital	Interest
Land	Rent
Entrepreneurship	Profit

A) Complete the table.

B) Compute GDP using the following equivalent approaches.

      i)   Product

      ii)   Expenditure

      iii)   Value Added

      iv)   Income

C) Although they agree theoretically, briefly discuss why these four approaches to calculating GDP may disagree when applied to a real-world industrialized economy, such as the United States. Does this inconsistency suggest that GDP is a poor measure of economic activity? Why or why not?

2) Working as a research assistant, the US Bureau of Economic Analysis (BEA) has provided you with the following table concerning quarterly US GDP. However, the file has been corrupted, with multiple entries missing. The use of Excel is required for this problem.

Line		2008 I	2008 II	2008 III	2008 IV
1	**Gross domestic product**	**14,373.90**	**14,497.80**	**14,546.70**	**14,347.30**
2	**Personal consumption expenditures**	**10,095.10**		**10,220.10**	**10,009.80**
3	Goods	3,447.20	3,474.90	3,463.00	3,227.50
4	Durable goods	1,145.80	1,126.50		1,019.90
5	Nondurable goods			2,374.50	
6	Services		6,719.80		
7	**Gross private domestic investment**		**2,164.60**	**2,142.70**	
8	Fixed investment	2,223.00	2,214.00		2,066.60
9	Nonresidential	1,705.00	1,719.70	1,711.00	
10	Structures		610.6	620.4	620.7
11	Equipment and software	1,118.70	1,109.20	1,090.60	1,018.00
12	Residential	518.1		468.6	427.8
13	Change in private inventories	-8.2			-44.5
14	**Net exports of goods and services**		**-738.7**	**-757.5**	**-590.5**
15	Exports	1,803.60		1,913.10	
16	Goods	1,247.30			1,155.70
17	Services		575.3	574.6	550.5
18	Imports	2,548.10	2,640.20	2,670.50	
19	Goods		2,226.80	2,243.30	
20	Services	404.9	413.4		404.2
21	**Government consumption expenditures and gross investment**	**2,808.40**			**2,905.90**
22	Federal			1,108.30	1,114.30
23	National defense	703.6	725.6		758.9
24	Nondefense	334.8	343.9	344.7	
25	State and local		1,807.60	1,833.10	

A) Complete the table.

B) Are imports added to or subtracted from US GDP? Provide a short rationale.

C) Your faculty advisor notices that US net exports increased substantially in the fourth quarter of 2008. This coincided with the worst of the financial crisis, during which international trade declined sharply. Strictly looking at the data, what is your explanation for this?

D) In 2008, stock market indices lost 20-25% of their value. Housing prices continued to collapse, and many households viewed real estate as an important form of wealth. Given these economic events, give a brief argument as to why US imports fell by 15%.

3) The following question deals with the GDP accounting equation and an approximation discussed by Mankiw 7e on p. 26. Equations (1) – (4) are provided, so you can take them as known already. "%Δ" stands for percentage change, and is defined in the typical way as $\%\Delta Y = (Y' - Y) / Y = \Delta Y / Y$.

$$Y_N = C + I + G + NX \qquad (1)$$

$$Y_R = Y_N / \text{GDP Deflator} = Y_N / D \qquad (2)$$

$$\%\Delta(AB) \approx \%\Delta A + \%\Delta B \qquad (3)$$

$$\%\Delta(A/B) \approx \%\Delta A - \%\Delta B \qquad (4)$$

Variable	Definition
Y_N	Nominal GDP
Y_R	Real GDP
C	Consumption
I	Investment
G	Gov't Exp.
NX	Net Exports
D	GDP Deflator

(1) is the GDP accounting equation; this is how GDP is defined using the expenditure approach. Total spending (GDP) equals the sum of expenditure on each of the four components. Equation (2) is just the definition of Real GDP when Nominal GDP is provided, translating between the two with the GDP Deflator. (3) and (4) are "arithmetic tricks" that Mankiw talks about on page 26 of the text.

A) Let's say that you know how fast the components of GDP are growing, and you know how much each component contributes towards the total. This information can be used to calculate the growth rate of Real GDP, provided that the inflation rate is known. In the question, you will show exactly how to do this. Write the growth rate of Real GDP ($\%\Delta\ Y_R$) in terms of the growth rates of C, I, G, and NX ($\%\Delta C$, $\%\Delta I$, $\%\Delta G$, $\%\Delta NX$) and the component shares of GDP (C / Y_N, I / Y_N, G / Y_N, NX / Y_N). Assume that the inflation rate is 3%. *[HINT: start by using (2) and (4) to write $\%\Delta\ Y_R$ in terms of $\%\Delta\ Y_N$ and $\%\Delta\ D$. $\%\Delta\ D$ is given to you in the problem. $\%\Delta\ Y_N$ can be written in terms of component growth rates and component shares. Remember that $\Delta\ Y_N = \Delta\ C + \Delta\ I + \Delta\ G + \Delta\ NX$, divide by Y_N, and do some algebra.]*

B) Let $C / Y_N = 0.65$, $I / Y_N = 0.10$, $G / Y_N = 0.20$, and $NX / Y_N = 0.05$. What is the effect on $\%\Delta\ Y_R$ of a 1% increase in $\%\Delta C$? What is the effect on $\%\Delta\ Y_R$ of a 1% increase in the inflation rate? *[HINT: This is asking for the derivatives $\partial(\%\Delta\ Y_R) / \partial(\%\Delta C)$ and $\partial(\%\Delta\ Y_R) / \partial(\%\Delta D)$. You can differentiate directly.]*

C) For the United States in the fourth quarter of 2008: $\%\Delta C = -2.05\%$, $\%\Delta I = -5.62\%$, $\%\Delta G = -1.21\%$, and $\%\Delta NX = 22\%$. Compute $\%\Delta Y_R$.

4) You are given prices for three goods from 2007-2009. The Consumer Price Index (CPI) market basket is two units of rice, one unit of apples, and one unit of oranges. The CPI is constructed in the usual way, with a value of 100 meaning that the overall price level has not changed.

(price per unit)	2007	2008	2009
Rice	0.5	0.4	0.3
Apples	0.25	0.4	0.6
Oranges	0.4	0.5	0.4

A) With 2007 as the base year, what is the CPI in 2007? *[HINT: no calculation required]*

B) With 2007 as the base year, what is the CPI in 2008? What about 2009?

C) What is the inflation rate from 2007 to 2008?

D) Using 2008 as the base year, what is the CPI in 2009? Between 2008 and 2009, did inflation or deflation occur? What is the inflation/deflation rate?

E) Briefly discuss the sensitivity of the CPI measure to the specification of the market basket.

F) Households start to consume a new good which was not in the CPI market basket before. This good was commercialized due to a recent technological advance. How could you keep the CPI measure consistent across time while accounting for this new good?

5) The following data on the labor force is provided to you by the US Bureau of Labor Statistics (BLS). Again, the database has been corrupted.

Adult Pop.	15000	Adult Pop., % Female	45%	Adult Pop., % Male	
Labor Force	10000	Labor Force, % Female	40%	Labor Force, % Male	
Unemployed		Unemployed, % Female	55%	Unemployed, % Male	
Employed	9000	Employed, % Female		Employed, % Male	

A) What is the total unemployment rate?

B) What is the total labor force participation rate?

C) What is the unemployment rate for females? What is the labor force participation rate for females?

D) What is the unemployment rate for males? What is the labor force participation rate for males?

6) "Accounting frameworks affect behavior. More generally, information affects behavior. What we gather our information about, and how we describe success, affects what we strive for. If GDP is what we think is success, people will strive for growing GDP. Politicians, for example, will then describe how they increased GDP x%, creating a sense of importance to the measure. By doing that though, they focus policies on things that will increase GDP." – Joseph Stiglitz

Do you think that GDP is an accurate/fair measure of human welfare/standard of living? Why or why not? What about real GDP/capita? How could it be improved, if improvement is necessary? Answer this in a few paragraphs.