Problem 1. Consider the following table:

	Firm 1	Firm 2	Firm 3	Firm 4
Sales Revenue ($)	540,000	330,000	230,000	385,000
Cost of Intermediate Goods ($)	200,000	150,000	130,000	80,000
Wages, Interest, Rent Paid to Households ($)	300,000	180,000	135,000	90,000

- Firm 1 sells its products to households, buys intermediate goods from Firm 2.

- Firm 2 sells its products to Firm 1 and Firm 3, buys intermediate goods from Firm 3.

- Firm 3 sells its products to Firm 2 and Firm 4, buys intermediate goods from Firm 2.

- Firm 4 sells its products to households, buys intermediate goods from Firm 3.

Determine the following values:

(a) Value of final goods sold by firm 1

(b) Value of final goods sold by firm 2

(c) Value of final goods sold by firm 3

(d) Value of final goods sold by firm 4

(e) Nominal GDP as the sum of the market values of the all final goods

Problem 2.   Consider the same table:

	Firm 1	Firm 2	Firm 3	Firm 4
Sales Revenue ($)	540,000	330,000	230,000	385,000
Cost of Intermediate Goods ($)	200,000	150,000	130,000	80,000
Wages, Interest, Rent Paid to Households ($)	300,000	180,000	135,000	90,000

- Firm 1 sells its products to households, buys intermediate goods from Firm 2.

- Firm 2 sells its products to Firm 1 and Firm 3, buys intermediate goods from Firm 3.

- Firm 3 sells its products to Firm 2 and Firm 4, buys intermediate goods from Firm 2.

- Firm 4 sells its products to households, buys intermediate goods from Firm 3.

Determine the following values:

(a) Value added by Firm 1

(b) Value added by Firm 2

(c) Value added by Firm 3

(d) Value added by Firm 4

(e) Nominal GDP as the sum of the values added

Problem 3. Consider the same table:

	Firm 1	Firm 2	Firm 3	Firm 4
Sales Revenue ($)	540,000	330,000	230,000	385,000
Cost of Intermediate Goods ($)	200,000	150,000	130,000	80,000
Wages, Interest, Rent Paid to Households ($)	300,000	180,000	135,000	90,000

- Firm 1 sells its products to households, buys intermediate goods from Firm 2.

- Firm 2 sells its products to Firm 1 and Firm 3, buys intermediate goods from Firm 3.

- Firm 3 sells its products to Firm 2 and Firm 4, buys intermediate goods from Firm 2.

- Firm 4 sells its products to households, buys intermediate goods from Firm 3.

Determine the following values:

(a) Income generated by firm 1

(b) Income generated by firm 2

(c) Income generated by firm 3

(d) Income generated by firm 4

(e) Nominal GDP as the total income generated

Expenditure

Note that *income is equal to expenditure.* This is simply because one person's income is another person's expenditure. Here's an example I'm shamelessly stealing from the book.

- Suppose you walk into a restaurant and buy some pancakes for $5.

- $5 of GDP is generated because it is the market value of the pancakes produced (production aspect).

- $5 of income is made by production factors (income aspect).

- You make an expenditure of $5 on those pancakes (expenditure aspect).

Problem 4.

Data for Islandia

Year	Haircuts		Coconuts Produced and sold by firms in Current Year		Coconuts Produced but not sold by firms in Current Year	Pineapples Produced and sold by firms in Current Year		Leftover Pineapples from previous year's production by firms sold in Current Year	Baskets weaved by households for their own use in Current year		Baskets weaved by households and sold to others in Current year		Pineapples imported from the neighboring island country in Current year	
	P	Q	P	Q	Q	P	Q		P	Q	P	Q	P	Q
2010	$10	102	$2.00	173	27	$ 1.00	100	20	$50.00	68	$50.00	75	$1.00	16
2011	$11	104	$2.00	203	1.75	$ 1.50	120	22	$55.00	70	$55.00	84	$1.50	16
2012	$11	106	$3.00	205	2	$ 1.75	140	26	$55.00	89	$55.00	91	$1.75	17
2013	$12	107	$3.10	210	0	$ 2.00	140	29	$56.00	90	$56.00	104	$2.00	19

Let 2011 be the base year. Calculate the following values:

(a) Islandia's nominal GDP in 2012

(b) Islandia's real GDP in 2013

(c) Islandia's GDP deflator in 2010

Problem 5. A used car dealer purchased my 1992 Ford Tempo for $1,000. He paid a worker $200 to wash it. He purchased four tires for a total of $400 to replace the existing tires on the car. He then sold the car for $4,000. All these economic activities took place in 2016. What was the used car dealer's value added in 2016?

Problem 6.   Here is Mrs. Baker's revenue and expenses for 2016:

- Revenue from sale of bread to customers: $65,000

- Cost of materials (such as sugar, yeast, baking soda, etc): $15,000

- Wages paid: $20,000

- Rent paid: $10,000

- Interest paid: 0

Find Mrs. Baker's contribution to 2016 GDP and find her profit in 2016.

Problem 7.   Which of the following are included in 2015 GDP?

(a) We imported $10 million worth of Italian wine in 2015.

(b) We exported $20 million worth of tomatoes to Europe in 2015.

(c) You fixed your uncle's neighbor's brother's ex-wife's garage door for $75 in 2015.

(d) The computers that Dell Corporation produced in 2015 that it could not sell.

(e) GM sold some cars in 2015 that it had produced in 2014.

(f) Dad sold his old lawn mower in a garage sale in 2015.

(g) The cost of a freeway overpass built by the government in 2015.

(h) The salaries paid to teachers in public schools in 2015.

Problem 8.   Ivan is a real estate investor. He flips homes—he buys undervalued homes and sells them at a higher price later to make a profit out of the price differential (these kind of people are called flippers). In May 2016 he bought a house built in 1997 for \$1,000,000 and sold it two months later for \$1,200,000. Not bad. The real estate agent got 6% of the sale price as her commission. As a result of these activities the 2016 GDP increased by how much?

Problem 9. *True or false.* Nominal GDP represents three things at the same time:

- The market value of all the final goods and services produced in that year (and intended for market sale).

- Aggregate expenditure on those goods and services.

- Aggregate income earned by the factors of production that produced those goods and services.

Problem 10. The U.S. government treats the goods produced by a firm in a year that are not sold in that year as increases in inventories and includes them in that year's GDP at market prices. In other words, the government assumes that the firm itself buys those goods for future resale. With that in mind, state whether the following are true or false.

(a) Any good produced in a year will be included in that year's GDP.

(b) Any good produced in a year will be included in that year's GDP, except those produced by households for household consumption.

(c) Any good produced and sold in a year will be included in that year's GDP.

(d) Any good produced and sold in a year will be included in that year's GDP, except those produced by firms that are not sold.

(e) Any good sold in a year will be included in that year's GDP.

(f) Any service sold in a year will be included in that year's GDP.

GDP Deflator

Recall from last week: if we use 2005 as the base year, and all prices in 2006 are 5% higher than in 2005, then the GDP deflator in 2006 will be 105. Now suppose that prices in 2007 are 5% higher than they were in 2006. Will the GDP deflator be 110 or something else?

From last time, we have

$$P_1^{2006} = 1.05 P_1^{2005} \quad and \quad P_1^{2006} = 1.05 P_1^{2005}.$$

We have a similar relationship among prices in 2006 and 2007:

$$P_1^{2007} = 1.05 P_1^{2006} \quad and \quad P_1^{2007} = 1.05 P_1^{2006}.$$

We can combine these two relationships to write 2007 prices in terms of 2005 prices:

$$P_1^{2007} = 1.05(1.05 P_1^{2005}) = 1.05^2 P_1^{2005} \quad and \quad P_1^{2007} = 1.05(1.05 P_1^{2005}) = 1.05^2 P_1^{2005}.$$

And therefore nominal GDP in 2007 will be

$$NGDP = 1.05^2 P_1^{2005} \times Q_1^{2007} + 1.05^2 P_2^{2005} \times Q_2^{2007}$$
$$= 1.05^2 (P_1^{2005} \times Q_1^{2007} + P_2^{2005} \times Q_2^{2007})$$
$$= 1.05^2 RGDP.$$

So we can now calculate the 2007 GDP deflator:

$$GDP\ Deflator = \frac{1.05^2 RGDP}{RGDP} \times 100$$
$$= 1.05^2 \times 100$$
$$= 110.25.$$

The lesson is that the percentage increase in the price level *compounds* over time—a consistent 5% increase in prices does not increase the GDP deflator by 5 every year.