

**Problem 1.** What is the difference between a stock variable and a flow variable?

**Answer 1.** Variables that we can measure at any point in time are called stock variables. For example, *right now, at this very instance in time*, I have ten donuts. My stock of donuts is ten donuts.

A flow variable is a variable that is measured over time. For example, in the last week I have purchased 15 donuts. There has been a flow of 15 donuts to my mouth this week.

Stock variables are the accumulation of flow variables. The money I save every month (a flow variable) accumulates into my savings account (a stock variable). Flow variables are changes in stock variables.

**Problem 2.** Which of the following will be included in 2009 GDP?

- (a) The value of a bookshelf that you build for yourself in 2009
- (b) The value of a boat that is produced in 2008 and sold in 2009
- (c) The value of a textbook that is produced in 2009 but not sold
- (d) The value of a used car that is sold in 2009
- (e) None of the above

**Answer 2: c.**

- (a) If you build it for yourself and don't sell it on the market, then it is not included in GDP.
- (b) If it's not produced in 2009, then it's not included in 2009 GDP
- (c) Something produced in 2009 and not sold is still considered part of 2009 GDP – they “buy” it from themselves at the market value.
- (d) A used car is not a final good so it is not included in GDP.

**Problem 3.** What is the main reason why national-income accountants estimate GDP using the values of the final goods rather than the value of all the goods produced in a year?

- (a) To include all the goods produced in GDP, but only once.
- (b) To exclude the values of all the intermediate goods produced from GDP.
- (c) To exclude the values of all the assets purchased from GDP.
- (d) To include the values of all the imported goods purchased in GDP.
- (e) None of the above

**Answer 3: a.** You don't want to "double count" anything. The flour the baker uses to make bread—an intermediate good in this case—is already included in the price of the bread.

**Problem 4.** Which of the following will NOT be included in 2009 GDP?

- (a) The value of lawn mower engines that Briggs and Stratton made in 2009 but could not sell.
- (b) The value of a computer chip produced in 2009 and used in the production of a personal computer.
- (c) The value of a piece of land Brad sold to Abe in 2009.
- (d) The value of a computer chip produced in 2009 that was not used in any personal computer.
- (e) None of the above

**Answer 4: c.** Land is considered an asset, and an asset is not the result of production. Therefore it is not considered part of GDP in any year.

**Problem 5.** The table below shows the prices and quantities of the two goods produced in a country in 2007, 2008, and 2009. These are the only goods produced in the country. What is nominal GDP in 2007?

Year	Good 1		Good 2	
	Price	Quantity	Price	Quantity
2007	\$2	4	\$6	2
2008	\$3	5	\$7	3
2009	\$4	8	\$8	5

**Answer 5.** Nominal GDP is the sum of prices times quantities in a given year. So nominal GDP in 2007 is

$$\$2 \times 4 + \$6 \times 2 = \$20.$$

**Problem 6.** The table below shows the prices and quantities of the two goods produced in a country in 2007, 2008, and 2009. These are the only goods produced in the country. Using 2008 as the base year, what is real GDP in 2007?

Year	Good 1		Good 2	
	Price	Quantity	Price	Quantity
2007	\$2	4	\$6	2
2008	\$3	5	\$7	3
2009	\$4	8	\$8	5

**Answer 6.** To calculate real GDP in 2007, multiply 2007 quantities by base year (2008) prices:

$$\$3 \times 4 + \$7 \times 2 = \$26.$$

**Problem 7.** Same thing as before. These are the only goods produced in the country. Using 2008 as the base year, what is the GDP deflator in 2007?

Year	Good 1		Good 2	
	Price	Quantity	Price	Quantity
2007	\$2	4	\$6	2
2008	\$3	5	\$7	3
2009	\$4	8	\$8	5

**Answer 7.** The GDP deflator is that year's nominal GDP divided by real GDP times 100:

$$\frac{NGDP}{RGDP} \times 100 = \frac{\$20}{\$26} \times 100 \approx 76.9.$$

**Problem 8.** The table below shows the revenue received and costs incurred by Ander's hamburger restaurant over the last year. What was Ander's restaurant's value added?

Ander's Burgers	
revenue	\$200,000
Costs	
Meat	\$20,000
Hamburger Buns	\$5,000
Wages	\$75,000
Interest	\$15,000
rent	\$25,000

**Answer 8.** Value added is revenue minus the cost of *intermediate goods purchased by the firm*:

$$\$200,000 - (\$20,000 + \$5,000) = \$175,000.$$



**Problem 9.** The table below shows the revenue received and costs incurred by Ander's hamburger restaurant over the last year. What was Ander's restaurant's profit?

Ander's Burgers	
revenue	\$200,000
Costs	
Meat	\$20,000
Hamburger Buns	\$5,000
Wages	\$75,000
Interest	\$15,000
rent	\$25,000

**Answer 9.** **Profit** is revenue minus *all* costs:

$$\$200,000 - (\$20,000 + \$5,000 + \$75,000 + \$15,000 + \$25,000) = \$60,000.$$

Notice that profit plus other factor income is the same as value added above,

$$\$60,000 + \$75,000 + \$15,000 + \$25,000 = \$175,000.$$

## Equivalent Statements of NGDP

We have equivalent ways of finding NGDP in an economy:

$$\begin{aligned}\text{Nominal GDP} &= \text{sum of value of final goods and services} \\ &= \text{sum of expenditure on final goods and services} \\ &= \text{sum of values added} \\ &= \text{sum of factor income.}\end{aligned}$$

We've touched the least on the expenditure aspect. This is because we'll be seeing a lot more of it later on. Make sure you know the difference between *factor* income and *household* income, 'cuz they ain't the same thing. (Household income can include capital gains, for instance, but capital gains are not a factor of production and therefore do not constitute factor income.)

**Problem 10.** You bought an old apartment complex in San Francisco for \$10 million in 2009 and sold it the same year for \$11 million. The real estate agent received a fee of \$1.2 million for the two transactions combined. What was the contribution of all of these transactions to the 2009 GDP?

**Answer 10.** You have a capital gain of \$1 million, which doesn't count towards GDP (because nothing was produced to earn that gain). But the real estate agent provided a service in 2009, so their fee of \$1.2 million counts towards 2009 GDP.

**Problem 11.** Suppose 2005 is the base year. In 2006 the prices of all goods and service produced increase by 5% over their 2005 values. Assuming that the same goods and services are produced in both years (although not necessarily in the same quantities), what can we say about the 2006 real GDP?

- (a) The 2006 real GDP will be higher than the 2005 real GDP by 5%
- (b) The 2006 real GDP will be lower than the 2005 real GDP by 5%
- (c) The 2006 real GDP will be the same as the 2005 real GDP
- (d) Need more information to answer
- (e) None of the above

**Answer 11: d.** Real GDP depends not on changes in prices but on changes in quantities produced, so telling us only the change in prices doesn't give us the information we need; specifically, we need to know quantities produced in 2006.

**Problem 12.** Suppose 2005 is the base year. In 2006 the prices of all goods and service produced increase by 5% over their 2005 values. Assuming that the same goods and services are produced in both years (although not necessarily in the same quantities), what can we say about the 2006 nominal GDP (NGDP)?

- (a) The 2006 NGDP will be higher than the 2005 real GDP by 5%
- (b) The 2006 NGDP will be lower than the 2005 real GDP by 5%
- (c) The 2006 NGDP will be the same as the 2005 real GDP
- (d) Need more information to answer
- (e) None of the above

**Answer 12: d.** In order to calculate 2006 NGDP, we need to know how both prices and quantities change from 2005. We still haven't been told how quantities produced change from 2005 to 2006, so we can't answer.

**Problem 13.** Suppose 2005 is the base year. In 2006 the prices of all goods and service produced increase by 5% over their 2005 values. Assuming that the same goods and services are produced in both years (although not necessarily in the same quantities), what can we say about the 2006 GDP deflator?

- (a) The 2006 GDP deflator will be 105
- (b) The 2006 GDP deflator will be 100
- (c) The 2006 GDP deflator will be 95
- (d) Need more information to answer
- (e) None of the above

**Answer 13: a.** We actually don't need to know the precise quantities in 2006 in order to calculate the GDP deflator.

Suppose that the economy consists of only two goods.

$$2006 \text{ RGDP} = P_1^{2005} \times Q_1^{2006} + P_2^{2005} \times Q_2^{2006},$$

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We are told that *all* prices increase by 5% from 2005 to 2006. This means that

$$P_1^{2006} = 1.05P_1^{2005} \quad \text{and} \quad P_2^{2006} = 1.05P_2^{2005}.$$

We can plug these into the equation for 2006 NGDP to get

$$\begin{aligned} 2006 \text{ NGDP} &= P_1^{2006} \times Q_1^{2006} + P_2^{2006} \times Q_2^{2006}. \\ &= 1.05P_1^{2005} \times Q_1^{2006} + 1.05P_2^{2005} \times Q_2^{2006} \\ &= 1.05(P_1^{2005} \times Q_1^{2006} + P_2^{2005} \times Q_2^{2006}) \\ &= 1.05(2006 \text{ RGDP}). \end{aligned}$$

$$\therefore \frac{2006 \text{ NGDP}}{2006 \text{ RGDP}} \times 100 = \frac{1.05(2006 \text{ RGDP})}{2006 \text{ RGDP}} \times 100 = 105.$$

**Problem 14.** Suppose that an average household in a small island country consumed only three goods. The following table shows the prices and quantities of these goods for three different years.

Year	Good 1		Good 2		Good 3	
	P	Q	P	Q	P	Q
1984	\$20.00	2	\$30.00	5	\$10.00	6
2006	\$40.00	4	\$60.00	7	\$20.00	8
2015	\$49.00	4	\$71.00	7	\$23.00	8

Assume that 1984 is the base year. What is the consumer price index (CPI) for 2006?



**Answer 14.** The point of CPI is to compare changes in the price level. So to calculate CPI, we hold the *quantities* fixed at the base year quantities (a *fixed basket of goods*), but allow prices to change. Then we compare the cost of that fixed basket to its base year cost:

$$CPI_{year} = \frac{\text{cost of fixed basket in year}}{\text{cost of fixed basket in base year}} \times 100.$$

That means we'll assume a fixed basket of 2, 5, and 6. The base year cost of the basket is

$$\text{cost of basket}_{1984} = (\$20 \times 2) + (\$30 \times 5) + (\$10 \times 6) = \$250$$

The cost of the same basket of goods in 2006 is

$$\text{cost of basket}_{2006} = (\$40 \times 2) + (\$60 \times 5) + (\$20 \times 6) = \$500.$$

And therefore

$$CPI_{2006} = \frac{500}{250} \times 100 = 200.$$

A CPI of 200 means the price level has doubled, which can easily be verified just by looking at the prices.