**Economics 102**

**Summer 2014**

**Answers to Homework #3**

**Due 7/9/14**

**Directions:** The homework will be collected in a box **before** the lecture. Please place your name, TA name and section number on top of the homework (legibly). Make sure you write your name as it appears on your ID so that you can receive the correct grade. Please remember the section number for the section **you are registered,** because you will need that number when you submit exams and homework. Late homework will not be accepted so make plans ahead of time. **Please show your work.** Good luck!

Please remember to

* Staple your homework before submitting it.
* Do work that is at a professional level: you are creating your “brand” when you submit this homework!
* Not submit messy, illegible, sloppy work.

1. For each of the following scenarios determine the effect on GDP of the described event. Then, explain the reasoning behind your answer.

a. Joe’s T-shirts produces 1000 t-shirts in 2013 and sells 1800 of these t-shirts in 2013 for a price of $10 per t-shirt. In 2014 Joe’s T-shirts produces another 1000 shirts and sells 600 t-shirts in 2014 for a price of $10 per t-shirt. What was the impact of Joe’s t-shirts on GDP in 2013 and 2014?

b. Susie owns 100 shares of IBM stock and during 2013 she sells 70 of these shares for $100 per share to Marty. In 2014 Susie purchases 35 shares of GM stock from Billy for $34 a share. What is the impact of these activities on GDP in 2013 and 2014?

c. Michael cuts his grass every Saturday as does his neighbor Millie. In 2013 Michael incorporates a lawn care business and starts providing lawn care services. Millie is one of his first customers and she pays him $20 a week to cut her grass. Her grass needs cutting for forty weeks. In addition, Millie contracts with Michael for snow removal and he gets paid $10 per week for the ten weeks of winter season to provide this service to Millie. Given Michael and Millie’s actions, what is the impact on GDP in 2014 from these events?

d. Both Josie and Zena in 2013 opened daycare facilities. Josie’s daycare is not licensed and is strictly a word-of-mouth, cash operation. Josie has ten children who come to the daycare facility for $250 per child per week. Josie’s daycare center is open for 50 weeks a year. Zena’s daycare is a licensed daycare facility for young children. She currently has 20 children that come to the daycare facility at a cost of $300 per child per week. The center is open for 50 weeks a year. What was the effect of Josie and Zena’s activities on GDP in 2014?

e. Elizabeth has a desk that has been in her family for 100 years. A recent appraisal of the desk noted that it was worth $1250 due to its age and uniqueness. In 2014 she realized that the desk needed some repair and refinishing after all these years of use. She took the desk to “Dr. Phil”, a local furniture restorer, who re-glued and refinished the desk. Dr. Phil charged Elizabeth $125.38 (including a sales tax of $8.38) for this work. What was the contribution to GDP in 2014 from these activities?

Answer:

a. GDP in 2013 changed by (1000 t-shirts)($10/shirt) = $10,000. An alternative way to see this is to use the expenditure approach: GDP = C + I + G + (X – M). C in 2013 from t-shirt consumption is (1800 t-shirts)($10/t-shirt) = $18,000. But, I in 2013 was (-800 t-shirts drawn down from inventory)($10/t-shirt) = $8,000. So, the effect on GDP in 2013 using the expenditure approach would be (the change in consumption spending) + (the change in investment spending) = ($18,000) + (-$8,000) = $10,000. Note that the two approaches give us the exact same number.

GDP in 2014 changed by (1000 t-shirts)($10/shirt) = $10,000. An alternative way to see this is to use the expenditure approach: GDP = C + I + G + (X – M). C in 2014 from t-shirt consumption is (600 t-shirts)($10/t-shirt) = $6,000. But, I in 2014 was (400 t-shirts added to inventory)($10/t-shirt) = $4,000. So, the effect on GDP in 2014 using the expenditure approach would be (the change in consumption spending) + (the change in investment spending) = ($6,000) + ($4,000) = $10,000. Note that the two approaches give us the exact same number.

b. There is no impact on GDP in 2013 or 2014 from these activities since there has been no production that has occurred as a result of these activities.

c. Michael continues to cut his grass and remove his snow through 2014, but because he is not doing these activities through an organized market this production does not count as part of GDP in 2014. However, the activities that Michael performs for Millie do get counted since he is now operating an incorporated lawn care service. So, the value of the lawn care service provided to Millie is (40 weeks)($20 per week) = $800. The value of the snow removal service is ($10 per week)(10 weeks) = $100. So, total value of production from the described activities in 2014 is $900.

d. GDP in 2014 was not affected by Josie’s daycare activities since she is operating a daycare facility that is not part of a legal, organized market. We know that because the daycare center is not licensed and it is a cash-only operation (this makes it far harder for the IRS and other government authorities to track what is going on at Josie’s). Zena’s activities increase GDP in 2014 by ($300 per child per week)(20 children per week)(50 weeks) = $300,000.

e. Although the desk is appraised at a high value, none of this appraised value is part of GDP in 2014. The desk when it was created a100 years ago was valued in GDP that year. But, the repair and refinishing work that was done in 2014 does get counted in GDP: we know that Dr. Phil is running a legal business because he is charging taxes on the work he is doing. GDP in 2014 will increase by $117.00 due to the production that Dr. Phil provided. Note that the tax of $8.38 does not represent production. If you wanted to include this amount, you would have to assume that there is government spending of $8.38 and that would make the increase in GDP from these activities equal to $125.38.

2. Suppose you are told that in the economy of Grantham that rent payments for land resources are equal to $150 million in 2014, interest payments for capital are equal to $120 million in 2014, consumer expenditures on goods and services are equal to $300 million in 2014, profits are equal to $40 million in 2014, government expenditures on goods and services are equal to $100 million in 2014, and net exports are equal to $20 million in 2014. You also know that in Grantham in 2014 that wage income was three times bigger than the level of investment spending on goods and services during that same year. Determine the level of GDP in Grantham in 2014, the level of wage income in 2014, and the level of investment spending in 2014. In determining these levels verbally describe how you are finding these answers and in your verbal description make specific reference to the definition(s) of GDP you are using to find the answers.

Answers:

To find these three measurements-GDP, I and wages-it is helpful to first organize the data you have been given. In your organization it is worth thinking about the various definitions of GDP: in particular, it is helpful to think about the factor payment approach to GDP measurement as well as the expenditure approach to GDP measurement. Recall the following:

Factor payment approach: GDP = wages + interest + rent + profits

Expenditure approach: GDP = C + I + G + (X – M)

Looking at the data we have:

Factor payment approach: GDP = wages + 120 + 150 + 40 or GDP = wages + 310

Expenditure approach: GDP = 300 + I + 100 + 20 or GDP = 420 + I

GDP should be equivalent using these two different methods of measurement, so we can write:

Wages + 310 = 420 + I or Wages = 110 + I

Looking at the given data we also know the relationship between wages and investment: wages = 3I or I = (1/3)wages. So, use this equation to substitute into the first equation:

Wages = 110 + (1/3)(wages)

(2/3)(wages) = 110

Wages = $165 million

Investment = $55 million

Factor payment approach: GDP = wages + 310 = 165 + 310 = $475 million

Expenditure approach: GDP = 420 + 55 = 425 + 100 = $475 million

3. You are told the following information about the economy of Mercadia. Consumers in this economy during 2014 make purchases of $3,500,000 on goods and services. Included in these purchases are purchases of $200,000 of Italian leather jackets (produced in 2014 in Italy and not produced in Mercadia), and $100,000 worth of pineapples grown in Cuba. Consumers in Mercadia also purchase $3,200,000 worth of newly constructed homes during 2014. Ace Metals, a company in Mercadia specializing in the manufacture of refrigerator units, produces $400,000 worth of these units in 2014. Ace sells $200,000 worth of these units to customers located outside of Mercadia, sells $50,000 of these units to business customers in Mercadia, and the remaining units are kept as inventory for Ace. In 2014 government purchases in Mercadia totaled $100,000 with $20,000 of these purchases coming from Elsewhere. There is no other data to consider when computing the GDP of Mercadia for 2014. For each question below show how you got your numerical value.

a. Given the above data, what is the level of consumer expenditure in Mercadia in 2014?

b. Given the above data, what is the level of government expenditure in Mercadia in 2014?

c. Given the above data, what is the level of investment expenditure in Mercadia in 2014?

d. Given the above data, what is the level of imports to Mercadia in 2014?

e. Given the above data, what is the level of exports to Mercadia in 2014?

f. Given the above data, what is the level of GDP in Mercadia in 2014?

Answer:

a. Total consumer expenditure for 2014 is equal to $3,500,000. This number will be adjusted by subtracting out the imported goods: the imports will be $200,000 worth of Italian leather jackets and $100,000 Cuban pineapples. While the $3,500,000 represents total consumption it includes production that was done outside of Mercadia.

b. Government expenditure in 2014 is equal to $100,000. This is total government expenditure with $80,000 representing production that occurred in Mercadia and $20,000 representing production that occurred outside of Mercadia. Again the import term will include the $20,000 that is not domestic production.

c. Investment expenditure is equal to the sum of new residential construction, inventory adjustment, and domestic plant and equipment expenditure. In this case investment expenditure is equal to $3,200,000 + $50,000 + $150,000 or $3,400,000. The $50,000 represents the refrigerator equipment that is purchased by businesses in Mercadia and the $150,000 is the inventory adjustment. The other $200,000 in refrigerator equipment production will be included in exports since these units were sold to buyers located outside of Mercadia.

d. Imports in this example are equal to the sum of the value of the Italian leather jackets + the value of Cuban pineapples + government imports. That is, imports are equal to $200,000 + $100,000 + $20,000 or $320,000. This is the value of goods and services purchased in Mercadia in 2014 that were not produced in Mercadia.

e. The level of exports in Mercadia is equal to $200,000, the value of the refrigerator equipment that was sold to businesses located outside of Mercadia.

f. GDP = C + I + G + (X – M)

From our work in (a) through (f) we know the following:

C = $3,500,000

I = $3,400,000

G = $100,000

X = $200,000

M = $320,000

So, GDP = $3,500,000 + $3,400,000 + $100,000 + ($200,000 - $320,000)

GDP = $6,880,000

4. Consider the community of Thomasville. There are five hundred people who live in Thomasville and your task is to answer the following set of questions based on the information below:

* In Thomasville there are 70 people who are less than 16 years old
* In Thomasville there are 20 people who are over 70 years old and are fully retired
* In Thomasville there are 40 people who are currently not working, are available to work, and have submitted job applications during the past four weeks
* In Thomasville there are 20 people who are currently not working, are available to work, but who have given up submitting job applications because they do not believe there is any work to be had in Thomasville
* In Thomasville there are 90 full-time college students who are not currently seeking work
* In Thomasville there are 100 people who are working part-time but who would like to work full-time
* The rest of the Thomasville population is over 16 years old and currently working

In your answers round to the nearest tenth of a percent when calculating the percent value.

a. What is the number of employed people in Thomasville? Explain how you got your answer.

b. What is the number of unemployed people in Thomasville? Explain how you got your answer.

c. What is the labor force equal to in Thomasville?

d. What is the unemployment rate in Thomasville? Show how you found your answer.

e. How would the unemployment rate change in Thomasville if discouraged workers were counted as unemployed workers? Verbally describe how the unemployment rate would change and then calculate a numeric value based on this change in the definition of unemployment.

f. How would the unemployment rate change in Thomasville if part-time workers were counted as unemployed workers rather than employed workers? Verbally describe how the unemployment rate would change and then calculate a numeric value based on this change in the definition of unemployment.

Answer:

Answer:

a. The number of employed people in Thomasville includes all those individuals who are 16 years old or older and who are currently working, whether working part-time or full-time. Thus, the number of employed people in Thomasville is equal to the 100 part-time workers plus the 160 full-time workers. To get the 160 full-time workers you need to start with the total population of Thomasville which is 500. Then subtract out the 70 children, the 20 people who are retired, the 20 people who are not working but who have also given up searching for work, the 40 people who are not working but who are still seeking a job, the 90 college students, and the 100 part-time workers. The total number of employed people in Thomasville is 260 people.

b. The number of unemployed people in Thomasville includes all those individuals who are 16 years old or older and who are currently not working, but who are available to work and who are also actively looking for a job. All three of these criteria must be met to be considered unemployed. Thus, in Thomasville the number of unemployed is equal to 40 people.

c. The labor force is defined as the number of employed plus the number of unemployed. In Thomasville the labor force is therefore equal to 300 people.

d. The unemployment rate is equal to [(the number of unemployed)/(labor force)] \* (100%). In this case we have that the unemployment rate is equal to [(40)/(300)] \* 100% = 13.3%.

e. If discouraged workers were counted as unemployed workers this would cause the unemployment rate to increase. In this example, changing the definition of unemployed so that it includes the discouraged workers would cause the number of unemployed to increase by 20 to 60 people; it would also cause the labor force to increase by 20 to 320 people. Thus, the unemployment rate with this change would equal [(60)/(320)] \* 100% or 18.75%.

f. If part-time workers were counted as unemployed workers this would cause the unemployment rate to increase. In this example, changing the definition of unemployed so that it includes the part-time workers would cause the number of unemployed to increase by 100 to 140 people (here I am leaving the discouraged workers out of the calculation); it would not affect the labor force which would still equal 300 people. Thus, the unemployment rate with this change would equal [(140)/(300)] \* 100% or 46.7%.

5. For each of the following scenarios decide whether the person is employed or unemployed. Explain the reasoning behind your answers.

a. Mary turned sixteen on April 4, 2014. She currently works at Kohl’s Department Store 10 hours a week. She is not enrolled in school.

b. Jose is twenty years old and works in his family’s accounting business for sixteen hours a week. Jose does not get paid for this work. Jose is not enrolled in school.

c. Susie volunteers ten hours a week with Habitat for Humanity. Susie is also enrolled as a full-time college student. Susie celebrated her 21st birthday at the Nitty Gritty in March, 2014.

d. Todd is out of work currently, but he is available to work and three weeks ago he submitted an application to a local software company that was advertising a job that he thought he might be able to get. However, yesterday Todd agreed to go on a four week long vacation with his first cousin to see the western United States. They will leave next Tuesday for their trip.

e. Tyler is not currently working, but is available for work and is looking for work. Tyler is finding it tough to find positions that suit his skills and interests. The last time Tyler submitted a job application was April 15, 2014 and it is now July 5, 2014. Tyler turned 19 on January 1, 2014.

f. Samantha is fifty five years old and she has worked throughout much of her adult life. In 2010 her work hours were cut to 20 hours a week at her job as a quality control officer for a local company. Samantha would like to work full-time and she is persistently looking for that kind of work and she is submitting job applications every week, but she has been unsuccessful in finding a full-time job.

g. Melinda works at a local copy shop forty hours a week. Melinda is 38 years old. But, for the past two weeks Melinda has not been at work and she has not been paid. Melinda and her family have been on a two week-long camping trip as part of their annual vacation.

Answers:

a. Mary is old enough to be included in the unemployment statistics and she is also not a full-time student. She is working for pay for at least one hour a week. Mary is considered employed.

b. Jose is old enough to be included in the unemployment statistics and he is also not a full-time student. He is working without pay for more than fifteen hours a week: Jose is considered employed.

c. Although Susie is old enough to be included in the unemployment statistics, she is a full-time college student and is therefore considered to be not in the labor force. Susie is not considered employed or unemployed.

d. Todd appears to be unemployed: out of work, available for work, and applying for a job within the last four weeks. However, his decision to accompany his cousin on a western tour for the next four weeks places him in the not in the labor force category since he will be unavailable to work during this next four week period of time.

e. Tyler is old enough to be included in the unemployment statistics and Tyler seems to meet the criteria for being considered unemployed: out of work, available for work, and applying for jobs. But, Tyler has not applied for a job within the last four weeks: Tyler would be considered not part of the labor force. Tyler is neither employed nor unemployed. His story is an example of a discouraged worker.

f. Samantha is old enough to be included in the unemployment statistics. Samantha works at least one hour a week for pay, so although Samantha would like full-time work and she is dissatisfied with her current work situation, she is still considered employed. She is an example of a marginally attached worker: a person who is currently working in a part-time position but who would like a full-time position.

g. Melinda is considered employed even though she has been on vacation from her job. She is over 16years old and she has a paid position with a company.

6. For this problem you will find it helpful to use either a calculator or an Excel spreadsheet. For your answers, round to the nearest hundredth.

In the economy of Greensboro the market basket for purposes of calculating the consumer price index (CPI) consists of 50 sandwiches, 1 moped and 60 apples. You are given the following information about prices of these three goods for the years 2010, 2011, and 2012. Assume the price is the price per unit.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Price in 2010 | Price in 2011 | Price in 2012 |
| Sandwich | $3.00 | $4.00 | $5.00 |
| Moped | $800.00 | $820.00 | $840.00 |
| Apples | $1.00 | $1.50 | $1.00 |

a. Given the above information, calculate the cost of the market basket and put your answers in the following table. In your homework show how you got these costs.

Cost of Market Basket

|  |  |
| --- | --- |
| Year | Cost of Market Basket |
| 2010 |  |
| 2011 |  |
| 2012 |  |

b. Calculate the CPI for 2010, 2011, and 2012 in Greensboro using a one hundred point scale and with the base year equal to 2010. Put your answers in the following table.

|  |  |
| --- | --- |
| Year | CPI with Base Year 2010 |
| 2010 |  |
| 2011 |  |
| 2012 |  |

c. Calculate the CPI for 2010, 2011, and 2012 in Greensboro using a one hundred point scale and with the base year equal to 2012. Put your answers in the following table.

|  |  |
| --- | --- |
| Year | CPI with Base Year 2012 |
| 2010 |  |
| 2011 |  |
| 2012 |  |

d. Calculate the annual rate of inflation in Greensboro using 2010 as the base year. In your answer show how you found this annual rate of inflation. Then put your answers in the following table.

|  |  |
| --- | --- |
| Year | Annual Rate of Inflation with Base Year 2010 |
| 2010 |  |
| 2011 |  |
| 2012 |  |

e. Calculate the annual rate of inflation in Greensboro using 2012 as the base year. In your answers show how you found this annual rate of inflation. Then put your answers in the following table.

|  |  |
| --- | --- |
| Year | Annual Rate of Inflation with Base Year 2012 |
| 2010 |  |
| 2011 |  |
| 2012 |  |

f. Are your answers in (e) and (f) the same? If they are not, then you have made an error and you should go back and correct the error before submitting your homework.

Answers:

a.

Cost of Market Basket

|  |  |
| --- | --- |
| Year | Cost of Market Basket |
| 2010 | (50 sandwiches)($3 per sandwich) + (1 moped)($800 per moped) + (60 apples)($1 per apple) = $1010 |
| 2011 | (50 sandwiches)($4 per sandwich) + (1 moped)($820 per moped) + (60 apples)($1.50 per apple) = $1110 |
| 2012 | (50 sandwiches)($5 per sandwich) + (1 moped)($840 per moped) + (60 apples)($1 per apple) = $1150 |

b.

|  |  |
| --- | --- |
| Year | CPI with Base Year 2010 |
| 2010 | [1010/1010] \* 100 = 100 |
| 2011 | [1110/1010] \* 100 = 109.90 |
| 2012 | [1150/1010] \* 100 = 113.86 |

c.

|  |  |
| --- | --- |
| Year | CPI with Base Year 2012 |
| 2010 | [1010/1150] \* 100 = 87.83 |
| 2011 | [1110/1150] \* 100 = 96.52 |
| 2012 | [1150/1150] \* 100 = 100 |

d.

|  |  |
| --- | --- |
| Year | Annual Rate of Inflation with Base Year 2010 |
| 2010 | ----- |
| 2011 | [(109.90 – 100)/(100)](100%) = 9.90% |
| 2012 | [(113.86 – 109.90)/(109.90)](100%) = 3.60% |

e.

|  |  |
| --- | --- |
| Year | Annual Rate of Inflation with Base Year 2012 |
| 2010 | ------ |
| 2011 | [(96.52 – 87.83)/( 87.83)](100%) = 9.89% (rounding discrepancy |
| 2012 | [(100 – 96.52)/( 96.52)](100%) = 3.61% (rounding discrepancy) |

f. Yes, except for a bit of rounding discrepancy the answers are the same. This is good since the rate of inflation should not depend upon the choice of the base year. The choice of the base year will affect the index numbers (remember the CPI is a price index) but it will not affect the calculation of the rate of inflation between two periods of time based on these index numbers.

7. Dominique graduated from college in May and received four job offers for a position in economics in four different cities. The work at each of the jobs will be interesting and challenging to Dominique and she does not have a strong personal preference as to where she would like to live. She does think it is important to compare the salaries for the four offers as well as the likely cost of living in each of the communities. The following table provides the information about the job offers that Dominique has received.

|  |  |
| --- | --- |
| Location of Offer | Salary (assume that all employee benefits are comparable and that all Dominique needs to consider is the salary) |
| Green Bay, WI | $70,000 |
| San Francisco, CA | $140,000 |
| Minneapolis, MN | $80,000 |
| Madison, WI | $82,000 |

Dominique knows that the cost of living is different in these four cities and she would like to choose that job which offers her the best standard of living. Based upon information I got from a Cost-of-Living Calculator on a website entitled [www.payscale.com](http://www.payscale.com) I have extrapolated an “inflation index” for each of these cities. Use this information to help guide Dominique on her decision: remember she only wants to know where her nominal income will provide the best standard of living.

Here is some data that you will find helpful:

|  |  |
| --- | --- |
| Location | Extrapolated Inflation Index |
| Green Bay, WI | 1 |
| San Francisco, CA | 1.71 |
| Minneapolis, MN | 1.16 |
| Madison, WI | 1.13 |

a. Use the above information to fill in the following table:

|  |  |  |  |
| --- | --- | --- | --- |
| Location | Nominal Salary | Real Salary | Extrapolated Inflation Index |
| Green Bay, WI |  |  | 1 |
| San Francisco, CA |  |  | 1.71 |
| Minneapolis, MN |  |  | 1.16 |
| Madison, WI |  |  | 1.13 |

b. Given your results in (a), which offer should Dominique accept?

Answers:

a.

|  |  |  |  |
| --- | --- | --- | --- |
| Location | Nominal Salary | Real Salary | Extrapolated Inflation Index |
| Green Bay, WI | $70,000 | $70,000 | 1 |
| San Francisco, CA | $140,000 | $81,871 | 1.71 |
| Minneapolis, MN | $80,000 | $68,966 | 1.16 |
| Madison, WI | $82,000 | $72,566 | 1.13 |

b. Dominique should accept the San Francisco offer since if offers the highest real salary of the four choices.

8. You are given the following information about an economy:

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Nominal GDP | Real GDP | GDP Deflator |
| 2000 | $200 Million |  | 80 |
| 2001 |  |  |  |
| 2002 |  | $300 Million | 100 |
| 2003 |  |  |  |
| 2004 |  |  |  |

You are also told that

* Nominal GDP increased by 10% between 2000 and 2001
* Real GDP stayed constant between 2000 and 2001
* Overall inflation, as measured by the GDP deflator, over the period 2000-2004 was 100%
* Real GDP increased 20% between 2002 and 2003
* Inflation increased by 20% between 2002 and 2003 as measured by the GDP deflator
* Nominal GDP between 2003 and 2004 stayed constant

a. Given the above information fill in the missing cells in the table.

b. Given the above information calculate the annual percentage change in nominal GDP, real GDP, and the GDP deflator. Put your answers in the following table. Round your answers to the nearest tenth.

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Percentage Change in Nominal GDP | Percentage Change in Real GDP | Percentage Change in GDP Deflator |
| 2000 | ---- | ---- | ---- |
| 2001 |  |  |  |
| 2002 |  |  |  |
| 2003 |  |  |  |
| 2004 |  |  |  |

c. What does it mean if the percentage change in real GDP is a negative number?

d. According to your calculations is the percentage change in nominal GDP always equal to the percentage change in the GDP deflator?

e. According to your calculations is the percentage change in real GDP always equal to the percentage change in nominal GDP?

Answers:

a.

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Nominal GDP | Real GDP | GDP Deflator |
| 2000 | $200 Million | $250 Million | 80 |
| 2001 | $220 Million | $250 Million | 88 |
| 2002 | $300 Million | $300 Million | 100 |
| 2003 | $432 Million | $360 Million | 120 |
| 2004 | $432 Million | $270 Million | 160 |

b. To find the percentage change in nominal GDP from 2000 to 2001 you will need to use the following formula:

Percentage Change in nominal GDP from 2000 to 2001 = {[(Nominal GDP in 2001) – (Nominal GDP in 2000)]/(Nominal GDP in 2000)}\*100%

Modify this formula with the appropriate measure from the appropriate year for the rest of the calculations.

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Percentage Change in Nominal GDP | Percentage Change in Real GDP | Percentage Change in GDP Deflator |
| 2000 | ---- | ---- | ---- |
| 2001 | 10% | 0% | 10% |
| 2002 | 36.36% | 20% | 13.6% |
| 2003 | 44% | 20% | 20% |
| 2004 | 0% | -25% | 33.33% |

c. Real GDP measures the total value of all final goods and services produced in a given year using constant dollar prices. If the percentage change in real GDP is a negative number this tells us that the constant dollar value of real GDP has fallen over the last year.

d. No the percentage change in nominal GDP is not necessarily equal to the percentage change in the GDP deflator. The relationship between the nominal GDP and the GDP deflator also includes real GDP; recall the formula relating these three concepts:

Real GDP = [(Nominal GDP)/(GDP deflator)] \* (scale factor)

e. No the percentage change in real GDP is not always equal to the percentage change in nominal GDP. See the formula relating real GDP, nominal GDP and the GDP deflator given in (d).