Economics 102
Summer 2016
Answers to Homework #2
Due Wednesday, June 29, 2016

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!

1. Analyze each of the following scenarios and provide a graph to illustrate your
answer. Use (Qo, Po) to designate the initial equilibrium price and quantity, and (Q',
P') to designate the new equilibrium price and quantity. Illustrate in your graph any
shifts that occur in the demand and/or supply curves.

a. Consider the market for automobiles which is initially in equilibrium. Suppose
that the discovery of fracking, a new technology, allows petroleum producers to
produce more petroleum at every price while at the same time consumers' tastes
and preferences for car ownership diminishes due to the creation of new car-
sharing possibilities (think Zipcar, etc.). Given these changes what do you predict
will happen to the equilibrium price and equilibrium quantity in the market for
automobiles?

b. Consider the market for corn which is initially in equilibrium. Suppose that the
weather during the corn growing season is unusually good for the growing of corn.
At the same time suppose that people's incomes have risen and corn is an inferior
good in consumption. Given these changes what do you predict will happen to the
equilibrium price and equilibrium quantity in the market for corn?

c. Consider the market for motorcoach tours which is initially in equilibrium.
Suppose that the cost of providing a motorcoach tour falls while at the same time
there is an increase in the size of the over 70 year old population (the age group that
most often enjoys taking a motorcoach tour!). Given these changes what do you
predict will happen to the equilibrium price and equilibrium quantity in the market
for motorcoach tours?

d. Consider the market for cruise vacations which is initially in equilibrium. Suppose
that there is an increase in people's incomes. Assume that cruise vacations are a
normal good. Given these changes what do you predict will happen to the
equilibrium price and equilibrium quantity in the market for cruise vacations.

e. Consider the market for cruise vacations which is initially in equilibrium. Suppose that ski vacations become more expensive and at the same time the number of cruise ships increases.

Answers:
a. Two changes are occurring in this example. Let's analyze the impact of the fracking technology first and then turn to the change in consumers' tastes and preferences after this analysis. When the fracking technology is developed this shifts the supply curve for petroleum to the right resulting in a decrease in the price of petroleum and an increase in the quantity of petroleum. The graph below illustrates this:
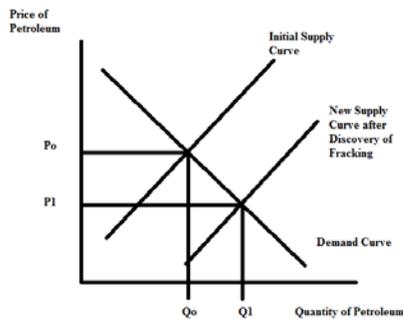
When the price of petroleum decreases this causes the demand for automobiles to shift to the right because petroleum and cars are complementary goods. So, the automobile market can be depicted as follows due to this change:
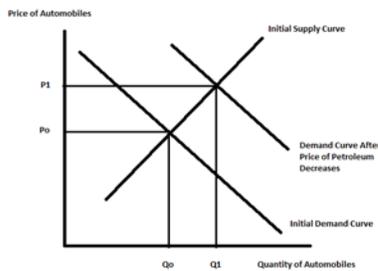
But, we still need to model the effect of consumers' tastes and preferences changing with regard to car ownership. We can model this as a leftward shift in the demand curve since at every price the quantity of cars demanded will be smaller. But, we don't know how large a shift occurs, so in the graph below I am providing two possible shifts:
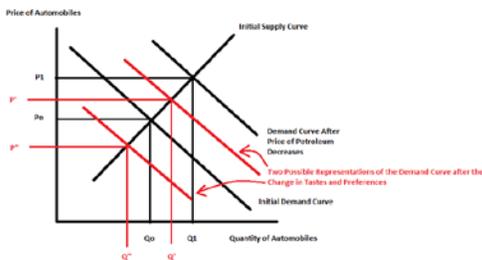
From the graph we see that we could be at (Q', P') or at (P", Q"): this tells us that in this example, with these two changes, that both the new equilibrium quantity and

the new equilibrium price are indeterminate relative to the initial equilibrium quantity and equilibrium price, (Q, P).

b. The demand curve will shift to the left since people's income have risen and corn is an inferior good: as incomes rise, people will choose to demand less of the inferior good at every price. The supply curve will shift to the right: if the weather is good for the growing of corn we can expect that the supply of corn will be greater at every price. This will result in the equilibrium price decreasing while the equilibrium quantity is indeterminate. The equilibrium quantity may increase relative to its initial level, it may decrease relative to its initial level or it may remain the same as its initial level. Here is a graph to illustrate this outcome:
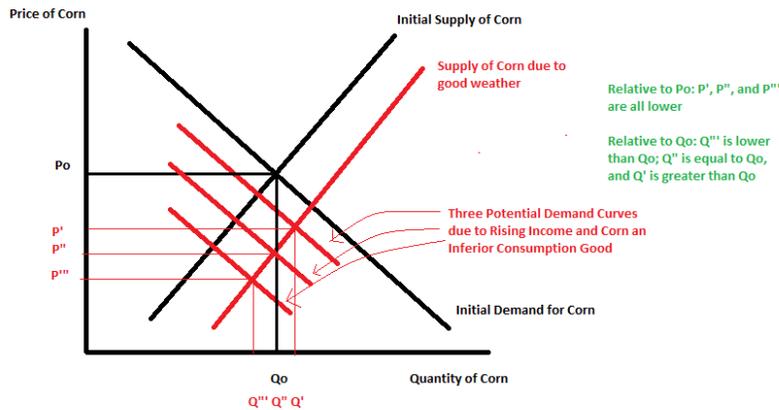
c. The supply curve will shift to the right with a decrease in the cost of providing motorcoach tours. The demand curve will shift to the right with an increase in the over 70 year old population: at every price there will be greater demand for this service. The new equilibrium quantity will be greater than the initial equilibrium quantity. The new equilibrium price may be greater than the initial equilibrium price, it may be less than the initial equilibrium price, or it may be the same as the initial equilibrium price. Here is a graph to illustrate this outcome:
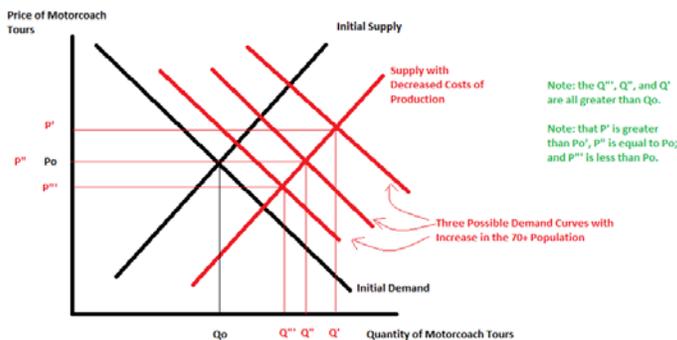
d. The increase in income will cause the demand curve for cruise vacations to shift to the right since cruise vacations are a normal good. The equilibrium price and the equilibrium quantity will both increase due to this change. Here's the graph:

Price of Cruise Vacations

Initial Supply Curve

P'

Po

Demand Curve with Increase in Income and Cruise Vacations a Normal Good

Initial Demand Curve

Qo   Q'   Quantity of Cruise Vacations
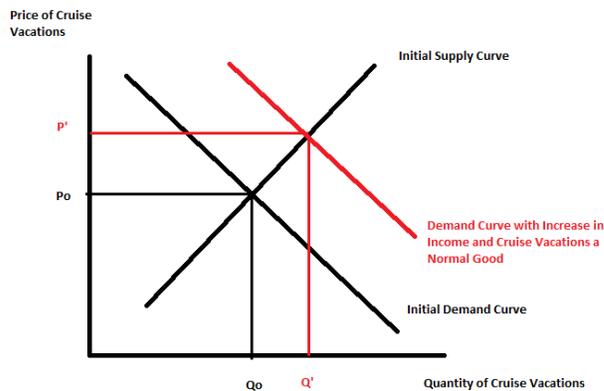
e. The demand curve for cruise vacations will shift to the right when the price of ski vacations increases since cruise vacations and ski vacations are substitute goods in consumption. The supply curve for cruise vacations will shift to the right if there is an increase in the number of cruise ships: at every price there will be greater quantity of the good supplied now that there are more cruise ships. These two shifts will result in the new equilibrium quantity increasing relative to the initial equilibrium quantity and the new equilibrium price being indeterminate relative to the initial equilibrium price. The graph in (c) provides an illustration: the two shifts are the same as those depicted in (c).

2. (Do not use a calculator on this problem: you are working to grow stronger computational skills and to do that I need you to stop turning to your calculator so quickly! Also, work this with the fractions (no decimals) but think about how you can "get rid of" the fractions. Another aspect that I am working on with respect to growing your numerical literacy.) Suppose there are two consumers in a market, Arthur and Susan. You are told the following information about this market. Arthur demands 200 units of the product sold in this market when the price is $2 per unit. When the price increases by $2, the quantity of the product he demands decreases by 50 units. Arthur's demand curve is linear. Susan demands 50 units of the product sold in this market when the price is $1 per unit. When the price increases to $5, the quantity of the product she demands decreases to 10 units. Susan's demand curve is linear.

a. From the above information write the equation for Arthur's demand curve.

b. From the above information write the equation for Susan's demand curve.

c. Assuming that Arthur and Susan are the only consumers of the product, draw a graph that illustrates the market demand curve for this product. Then, provide an algebraic expression for the market demand curve. If you need more than one

equation please be sure to note what the relevant range of prices is for each equation.

Now, suppose that Susan's income increases so that at every price Susan consumes three times as much of the good as she did originally. [Hint: you might find it helpful to draw a graph of Susan's initial demand curve and then from this graph draw her new demand curve.]

d. Given this new information write the equation for Susan's new demand curve.
e. Given this new information, provide an algebraic expression for the market demand curve. If you need more than one equation please be sure to note what the relevant range of prices is for each equation.

Answers:
a. Arthur's demand curve contains the points (Q, P) = (200, $2) and (150, $4). It is also linear. So, we can use this information to find the slope: m = -1/25. Then, use the general slope-intercept form, y = mx + b to find the equation. The equation is P = 10 - (1/25)Q.

b. Susan's demand curve contains the points (Q, P) = (50, $1) and (10, $5). It is also linear. So, we can use this information to find the slope: m = -1/10. Then, use the general slope-intercept form, y = mx + b to find the equation. The equation is P = 6 – (1/10)Q.

c. Let's start with a sketch:
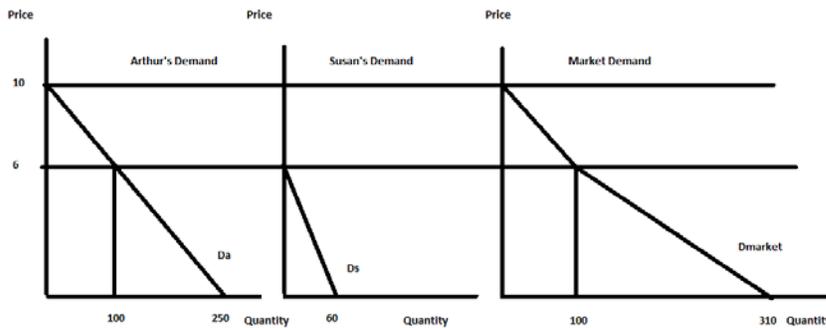
To find the market demand curve you need to horizontally sum the individual demand curves in the market. A simple sketch will guide you in this process. If you draw a graph of Arthur's demand curve, P = 10 - (1/25)Q, and a sketch of Susan's demand curve, P = 6 - (1/10)Q, then you can hold price constant and sum the quantity demanded by Arthur and Susan at this price. Thus, when the price is 10, the quantity demanded by the two consumers is 0 units. When the price is 6, the quantity demanded by the two consumers is 100 units (all demanded by Arthur). With two linear demand curves summed together horizontally we can see that when the price is 0, the sum will be equal to 310 units. The demand curve will have a kink in it that occurs at a price of $6. For prices greater than or equal to $6, the market demand curve is P = 10 – (1/25)Q, which is Arthur's demand curve since at prices

greater than or equal to $6 Arthur is the only demander of the good. For prices less than or equal to $6, the market demand curve is P = 62/7 - (1/35)Q. Let me show you how I found this and let me provide you with two methods:

Method One: I know that (Q, P) = (100, 6) and (310, 0) are two points on the lower segment of the demand curve. So,

m = slope = (6 - 0)/(100 - 210) = -6/210 = -2/70= -1/35

y = mx + b is the slope-intercept form. I will use this plus one of the points (100, 6) to find the value of "b". This procedure should be starting to seem familiar to you: we use this procedure frequently in this class.

P = (-1/35)Q + b

6 = (-1/35)(100) + b

6(35) + 100 = 35b

210 + 100 = 35b

310 = 35b

b = 310/35 = 62/7

P = (62/7) - (1/35)Q for prices less than or equal to $6.

Method Two: I could use my algebra skills to find this equation. I am summing horizontally so if I write the two equations in x-intercept form and then add them together I can get the market demand curve. So, here is the work:

Arthur's Demand:

      P = 10 - (1/25)Q in y-intercept form

      Q = 250 - 25P in x-intercept form

Susan's Demand:

      P = 6 - (1/10)Q in y-intercept form

      Q = 60 - 10P in x-intercept form

Market Demand:

      Qa + Qs = Qtotal

      Qtotal = (250 - 25P) + (60 - 10P)

      Q = 310 - 35P in x-intercept form (note: that 310 is the x-intercept for the lower segment of the market demand curve)

      Or, P = (62/7) - (1/35)Q for prices less than or equal to $6

d. Now Susan's demand curve will contain the points (0, $6) and (180, $0). (I drew a sketch to direct my work and so should you!) Draw a sketch of the original demand curve and note that when price is equal to $6 Susan demands 0 units and when price is equal to $0, the quantity she demands is equal to 60 units. Then, think about what quantities she will demand at each of these prices now that her consumption has tripled at every price. She will consume (0, $6) and (180, $0). The new demand curve for Susan can be written as P = 6 - (1/30)Q.

e. You are now adding together Arthur's demand curve and the new demand curve for Susan. When you do this you will see that for prices greater than or equal to $6 the market demand curve is Arthur's demand curve since Susan is unwilling to buy any of the good if the price is $6 or greater. Thus, for prices equal to or greater than $6, the market demand curve is P = 10 – (1/25)Q. For prices less than or equal to $6

you need to figure out two points on the market demand curve so that you can then use these points to find the market demand curve. Two points on the lower segment of the market demand curve are (100, $6) and (430, $0). From these two points you can find the market demand curve (using Method Two from above):

Method Two: I could use my algebra skills to find this equation. I am summing horizontally so if I write the two equations in x-intercept form and then add them together I can get the market demand curve. So, here is the work:

Arthur's Demand:

      $P = 10 - (1/25)Q$ in y-intercept form

      $Q = 250 - 25P$ in x-intercept form

Susan's Demand:

      $P = 6 - (1/30)Q$ in y-intercept form

      $Q = 180 - 30P$ in x-intercept form

Market Demand:

      $Qa + Qs = Qtotal$

      $Qtotal = (250 - 25P) + (180 - 30P)$

      $Q = 430 - 55P$ in x-intercept form (note: that 430 is the x-intercept for the lower segment of the market demand curve)

      Or, $P = (86/11) - (1/55)Q$ for prices less than or equal to $6

Note: you can check that this equation works for both points: $(Q, P) = (100, \$6)$ and $(430, \$0)$. It does: I just checked it to make sure my math was right! And, I did not use a calculator throughout this entire problem.....best to not use one as you strengthen your numerical literacy!

3. Suppose that a small, closed economy manufactures photo albums. There are four domestic manufacturers of these albums and they have identical supply curves. Suppose the supply curve for a single manufacturer of these albums is given by the equation $P = 2Q + 20$. Additionally you know that the domestic demand for photo albums in this small, closed economy is given by the equation $P = 110 – Q$.

a. What is the domestic supply curve for photo albums in this economy?

b. Given the domestic supply curve and the domestic demand curve, what is the equilibrium price and quantity of photo albums in this economy if the economy is closed?

c. Calculate the value of consumer surplus, producer surplus, and total surplus if the domestic economy is a closed economy with regard to the photo album market.

d. Suppose that this economy decides to open this market to trade. Analyze what happens in this market if the world price of photo albums is $30 per album. In your answer identify the level of imports or exports, the new level of consumer surplus, the new level of producer surplus, the new level of total surplus, and identify the distributional consequences of opening this market to trade.

e. Suppose that this economy decides to open this market to trade. Analyze what happens in this market if the world price of photo albums is $80 per album. In your answer identify the level of imports or exports, the new level of consumer surplus, the new level of producer surplus, the new level of total surplus, and identify the distributional consequences of opening this market to trade.

f. Suppose that this market for photo albums is opened to world trade and the world price is $30. Furthermore, suppose that the government of this economy decides to implement a tariff so that the price of photo albums in the small open economy is equal to $40 per one imported album. Analyze the effect of this tariff on imports or exports, consumer surplus, producer surplus, total surplus, government tariff revenue and deadweight loss relative to the results you got when the market was open to trade and there was no tariff.

Answers:

a. A quick sketch of the firm supply curve may help you when you are working to find the market supply curve. You know that a single firm will produce 0 units when the price is $20 and 10 units when the price is $40. If there are four identical firms that implies that the four firms will produce 0 units when the price is $20 and 40 units when the price is $40. Thus, (0, $20) and ($40, 40) are two points on the market supply curve. We can write the market supply curve as P = (1/2)Q + 20.
An alternative method for finding this market supply curve:
Rewrite the individual supply curve in x-intercept form: Q = (1/2)P – 10
Then, add four of these curves together to get Qtotal:
Qtotal = [(1/2)P – 10] + [(1/2)P – 10] + [(1/2)P – 10] + [(1/2)P – 10] or
Qtotal = 4[(1/2)P – 10] = 2P – 40
Rearrange this equation into y-intercept form:
2P = Q + 40
P = (1/2)Q + 20

b. Use the domestic supply curve and the domestic demand curve to solve for the equilibrium. Thus, (1/2)Q + 20 = 110 – Q or Q = 60 units and P = $50.

c. Consumer surplus is equal to (1/2)($110/unit - $50/unit)(60 units) = $1800. Producer surplus is equal to (1/2)($50/unit - $20/unit)(60 units) = $900. Total surplus is equal to the sum of consumer surplus plus producer surplus or $2700.

d. When the world price is $30 per photo album and this economy opens to trade, domestic suppliers will supply 20 photo albums while domestic consumers will demand 80 photo albums. The excess demand for 60 photo albums will be imported from the world market. Consumer surplus will equal $3200 and will be larger than it was when this market was closed to world trade. Producer surplus will equal $100 and will be smaller than it was when this market was closed to world trade. Trade is

4. Here are a variety of situations to analyze.

a. Bicycles Galore produces 200 bicycles that are being sold for $200 per bicycle in 2013, 300 bicycles that are being sold for $150 per bicycle in 2014, and 400 bicycles that are being sold for $200 per bicycle in 2015. What is GDP in this economy in 2013 if Bicycles Galore is the only producer of final goods and services in this economy?

b. Bicycles Galore produces 200 bicycles that can be sold for $200 per bicycle in 2013, 300 bicycles that can be sold for $150 per bicycle in 2014, and 400 bicycles that can be sold for $240 per bicycle in 2015. Bicycles Galore actually sells 100 bicycles for $200 per bicycle in 2013, 250 bicycles for $150 per bicycle in 2014, and 75 bicycles for $200 per bicycle in 2015. All other bicycles end up in the inventories of Bicycles Galore. What is GDP in this economy in 2013 if Bicycles Galore is the only producer of finals goods and services in this economy? What is the level of consumer expenditure in this economy (assume there is only one firm, Bicycles Galore, in this economy). What is the level of investment expenditure in this economy? What is the composition of investment expenditure in this economy?

c. In 2014, Bicycles Galore produces and sells 300 bicycles at a price of $150 per bicycle. In addition they sell all the bicycles they produced in 2013 but did not sell in 2013 (refer back to part (b) to see how many bicycles they did not sell). The bicycles

that were produced in 2013 and that were sold in 2014 were sold at their 2013 prices. What is the value of consumer expenditure in 2014? What is the value of GDP in 2014? What is the value of inventory investment in 2014?

Answers:

a. GDP in 2013 = (200 bicycles)($200 per bicycle) = $40,000

b. GDP in 2013 = $40,000
Consumer Expenditure = (200 bicycles)($200 per bicycle) = $20,000
Investment Expenditure = Inventory Change in this example = (100 bicycles)($200 per bicycle) = $20,000

c. Consumer expenditure in 2014 = (300 bicycles)($150 per bicycle) + (100 bicycles)($200 per bicycle) = $65.000
GDP in 2014 = (300 bicycles)($150 per bicycle) = $45,000
Inventory investment in 2014 = -$20.000
GDP in 2014 = Consumer Expenditure + Investment Expenditure = $65,000 - $20,000 = $45,000

5. Suppose you are given the following information about an economy for the year 2015.

Consumption Expenditures	$3000
Business Expenditure on Plant and Equipment	$1000
Tax Revenues	$800
Imports	$700
Government Expenditures	$600
Inventory Change for the Year	-$100
Exports	$500
Government transfer payments	$100
New Home Construction	$400

a. Given the above information, is this economy a net exporter or a net importer?

b. Given the above information, what is the level of investment in this economy for 2015?

c. Suppose we define the government budget balance as being equal to government expenditures minus net taxes. Furthermore, suppose that net taxes are equal to tax revenues minus transfer payments from the government. What is the government budget balance for this economy? Is the government operating with a surplus, a deficit, or a balanced budget? Explain your answer.

d. What is the value of GDP in 2015 for this economy?

Answers:

a. Exports are equal to $500 while imports are equal to $700. This country exports less than it imports, so this country is a net importer (it has a trade deficit).

b. Investment is equal to the sum of business expenditure on plant and equipment plus new home construction plus inventory change. Thus, in this example investment is equal to $1000 + $400 + (-$100) = $1300.

c. Net taxes in this example are equal to $800 - $100 = $700. The government budget balance is therefore equal to $600 - $700 = -$100. The government is running a surplus since its expenditures are less than its tax revenues.

d. GDP = C + I + G + (X – M) = $3000 + $1300 + $600 + ($500 - $700) = $4700.

6. Use the following information to answer this question. Suppose there are three firms in the economy: firm A produces the inputs that are used by firm B. Firm B produces the inputs that are used by Firm C. Assume that all of firm A's product is purchased by firm B and that all of firm B's product is purchased by firm C. Firm C is the only firm that produces a final good or service in this economy. You are provided the following information about these three firms.

	Firm A	Firm B	Firm C	Total Factor Income
Value of Sales	$6,000	$21,000	$31,000	---
Intermediate Goods	$0	$6,000		---
Wages	$1500	$5000		$12,000
Interest Payments		$2000	$1500	
Rent	$2000			$9000
Profit	$1000	$3000		$5000
Total Expenditure by Firm		$21,000		---
Value Added by Firm=Value of Sales – Cost of Intermediate Goods				

a. Fill in the missing entries in the above table.
b. What is the value of aggregate spending on domestically produced final goods and services in this economy?
c. What is the value of total payments to factors of production in this economy?
d. What is the value of total production in this economy using the value added approach?
e. Are your answers to parts (b), (c), and (d) the same? Explain your results.

Answer:

	Firm A	Firm B	Firm C	Total Factor Income
Value of Sales	$6,000	$21,000	$31,000	---
Intermediate Goods	$0	$6,000	$21,000	---
Wages	$1500	$5000	$5500	$12,000
Interest Payments	$1500	$2000	$1500	$5000
Rent	$2000	$5000	$2000	$9000
Profit	$1000	$3000	$1000	$5000
Total Expenditure by Firm	$6000	$21,000	$31,000	---
Value Added by Firm=Value of Sales – Cost of Intermediate Goods	$6000	$15,000	$10,000	$31,000

a. Since the value of sales by firm B is equal to $21,000 and firm B only sells to firm C we can conclude that the cost of intermediate goods for firm C is equal to $21,000. Since total wages are equal to $12,000 and we know wage payments for firm A and firm B it is a simple matter to calculate wage payments to firm C: 12,000 = 1500 + 5000 + wage payments by firm C. Wage payments by firm C = $5,500. Since we know the value of sales for firm A we use this information to find the interest payment for firm A. Once we have that interest payment we can calculate the total amount of interest paid in this economy. We can calculate rent paid by firm B by noting that total expenditure is equal to the sum of the cost of intermediate goods + wages + interest payments + rent + profit. Once you have rent paid by firm B you can then easily calculate rent paid by firm C. Profit for firm C is also easily calculated. The rest of the entries should be fairly straight forward at this point.

b. $31,000

c. $31,000

d. $31,000

e. Since GDP for an economy can be calculated using the expenditure approach, the factor payment approach or the value added approach these answers should all be equivalent for this economy.