

# Econ 1: Spring 2016: Problem Set 9: Sample Final Exam with Answers

## PART A

NAME:

GSI NAME:

SECTION TIME:

SECTION NUMBER:

### Section I: Market Success (20 points/36 minutes):

1. (2 pts.) The highest price Frodo is willing to pay for a ring is \$50 and the highest price Sam is willing to pay for a ring is \$40. The price of rings is \$45. What is the surplus for Frodo and Sam?

**(\$5 for Frodo and \$0 for Sam)**

(\$5 for Frodo and -\$5 for Sam)

(\$10 for Frodo and -\$10 for Sam)

(\$0 for both)

(\$10 for Sam, -\$5 for Frodo)

2. (2 pts.) The demand curve for carrots by Bugs Bunny and Friends is  $P = 10 - 0.2 \times Q$ . There is only carrot producer. What is the slope of the marginal revenue curve for the carrot producer?

(-.2) (+.2) **(-.4)** (+.4) (it cannot be determined from the information given)

3. (2 pts.) The average cost is:

**(the total cost of undertaking to produce n units of a commodity in a year, divided by n)**

(the cost of a commodity in the base year)

(the cost that must be paid per year to amortize fixed costs)

(the sum of all the marginal costs for all the different units of the commodity)

(none of the above)

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4. (2 pts.) If we have straight-line demand and supply curves, the average willingness to pay is:

(in general equal to the market price)

(the average of the y-intercepts of the supply and demand curves)

**(in general equal to the average of the market price and the most anyone is willing to pay for the commodity)**

(in general equal to the average of the market price and the least at which anyone is willing to produce and sell the commodity)

(in general equal to the value of the demand curve at the quantity at which the monopolist's marginal revenue curve intersects the supply curve)

5. (4 pts.: answer this with a few sentences—a very short paragraph): Why do we say that the competitive market in equilibrium without market failures successfully performs its allocative function of (a) having the right amount of the commodity produced by (b) the right organizations?

**(a) Because every potential purchaser with a willingness-to-pay above the equilibrium competitive market price buys, and every maker/seller with an opportunity-cost below the equilibrium competitive market price makes/sells. Producing more would mean producing and selling units that could not possibly be win-win deals. Producing less would mean leaving some possible win-win deals on the table, uncaptured.**

6. (4 pts.) The demand for tennis rackets, in millions, is given by  $P = \$520 - \$20 \times Q$ . The supply is given by  $P = \$100 + \$40 \times Q$ .

What is the equilibrium price, in dollars? \_\_\_\_\_ **\$380**

What is the equilibrium quantity, in million? \_\_\_\_\_ **7 million**

What is the producer surplus? \_\_\_\_\_ **\$980 million**

What is the consumer surplus? \_\_\_\_\_ **\$490 million**

$$520 - 20Q = 100 + 40Q$$

$$400 = 60Q$$

$$Q = 7 \text{ million}$$

$$P = \$380$$

$$CS = [(520 + 380)/2 - 380] \times 7 = 70 \times 7 = \$490 \text{ million}$$

$$PS = [380 - (380 + 100)/2] \times 7 = 140 \times 7 = \$980 \text{ million}$$

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7. (4 pts.) Suppose that today we have five potential yoga students and five potential yoga teachers, with the following willingnesses-to-pay for and opportunity costs of teaching one-on-one yoga lessons:

<b>Student Willingness-to-Pay</b>		<b>Teacher Opportunity Cost</b>	
Adolf	\$205	Charles	\$75
Augusto	\$115	Franklin	\$255
Benito	\$65	Jieshi	\$45
Francisco	\$85	Josef	\$95
Hideki	\$35	Winston	\$15

If the price at which yoga lessons are bought and sold must be a multiple of \$10, and if willingnesses-to-pay and opportunity costs are a good guide to societal values and societal opportunity costs...

- In an efficient economy, how many yoga lessons will be taught today? \_\_\_\_\_ **3**
- Will Josef teach yoga in an efficient economy? \_\_\_\_\_ **no**
- What will the total surplus in dollars be in an efficient economy? \_\_\_\_\_ **\$270**
- If we implement the efficient allocation via a competitive market in equilibrium, what will be the consumer surplus? \_\_\_\_\_ **\$165**

**3 lessons, no, \$270, \$165**

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## Section II: Market Failure (20 points/36 minutes):

1. (2 pts.) A public good is a good that is:

**(neither rival nor excludible)**

(rival but not excludible)

(excludible but not rival)

(both rival and excludible)

2. (2 pts.) Requiring licenses to produce and issuing a quantity of licenses to producers for free only slightly lower than the market equilibrium quantity will in general be:

**(advantageous for producers as a group but not for consumers)**

(advantageous for consumers as a group but not for producers)

(advantageous for neither producers nor consumers as groups)

(advantageous for both producers and consumers as groups)

3. (2 pts.) Giving your product that is of real usefulness to users away and selling the eyeballs or ears of your users to advertisers is:

(one of the very few ways that a public goods can be sustainably provided without drawing on tax revenues)

(a grossly economically inefficient way of providing a good)

(a business model unknown before 1830)

**(all of the above)**

(none of the above)

4. (2 pts.) which of the possibilities below is not a possible way to reduce the economic inefficiency of a “natural monopoly”?:

(nationalizing the firm and having the commodity provided by the government)

(imposing a price ceiling on what the firm can charge)

**(breaking up the company into five or more smaller competitors)**

(restructuring the industry so that the non-rival component of costs is provided by a government-sponsored enterprise)

(all of the four above are potential ways to try to reduce the economic inefficiency of a “natural monopoly”)

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5. (4 pts.: answer this with a few sentences—a very short paragraph) short answer  
You are a politician who is in charge of setting the minimum wage. You want to maximize the total amount of pay minimum wage workers receive and there is only one company who hires minimum wage workers. It sells the product of the minimum wage workers at \$22 per worker-hour. At a wage of \$14, no workers will work for them, but for each \$1 increase in wage, an additional 10 workers will be willing to work for the employers.

What is the total amount of pay workers will receive if you do not set a minimum wage? What should you set the minimum wage at?

**This is a monopoly problem in reverse: a monopsony problem, single buyer whose actions control the price rather than a single seller. The marginal cost curve that the fast-food company faces has the same y-axis intercept as the supply curve—\$14—and is twice as steep—rises by 20 workers for each \$1 it raises the wage. The marginal cost thus reaches the price the company can sell the product for—\$22—at 40 workers. It will choose to set its wage at \$18.  $18 \times 40 = \$720$  per hour. The politician should set a minimum wage of \$22. It would attract 80 workers for \$1760 per hour.**

6. (4 pts) A barrel of oil can be refined into 55 gallons of gasoline. The United States consumes 20 million barrels of oil a day at a current price of \$40/barrel. Suppose that burning this much in the way of petroleum products per day imposes \$1.1 billion/day of costs on the future via the extra global warming generated.

a) What is the optimal Pigovian tax to impose on competitive sellers of gasoline in order to get society to properly balance the benefits of using gasoline with the externality costs of the extra global warming generated? \_\_\_\_\_ **\$1/gal**

b) If every seller of gasoline is a seller in a competitive market and there are constant returns to scale in production, by how much would you expect the price of gasoline to go up after the imposition of the optimal Pigovian tax? \_\_\_\_\_ **\$1/gal**

c) If every seller of gasoline is a monopolist in the local market in which they sell, by how much would you expect the price of gasoline to go up after the imposition of the tax in (a)? \_\_\_\_\_ **\$0.50/gal**

d) Do you have enough information to calculate what the optimal Pigovian tax to impose in if every seller of gasoline is a monopolist? \_\_\_\_\_ **no**

**\$1.00/gallon; \$1.00/gallon; \$0.50/gallon; no**

NAME:

7. (4 pts.) Sauron acquires a monopoly over the making of rings of power in Middle-Earth. He can construct a ring forge in the Sammath Naur, the Chamber of Fire of Mt. Doom, for a cost of \$1 million gold pieces. If he constructs a forge, he can then make an unlimited number of rings of power at a marginal cost of \$20,000 gold pieces each.

Suppose Sauron wants to maximize his profits:

Suppose that total lifetime demand for rings of power by elves, dwarves, and humans is given by:  $P = 100,000 - 4000 \times Q$ . Will Sauron pay the fixed cost, build the ring forge, and enter the ring-making business? \_\_\_\_\_

**No. Profits are maximized making 10 rings at a margin of 40,000GP/ring; the 400,000GP in operating profit does not cover the fixed costs of 1,000,000GP**

Suppose that total lifetime demand for rings of power by elves, dwarves, and humans is given by:  $P = 204,000 - 4000 \times Q$ . Will Sauron pay the fixed cost, build the ring forge, and enter the ring-making business? \_\_\_\_\_

**Yes. Profits are maximized making 23 rings at a margin of 92,000GP/ring; the 2,114,000GP in operating profit more than covers the fixed costs of 1,000,000GP**

Suppose that total lifetime demand for rings of power by elves, dwarves, and humans is given by:  $P = 196,000 - 8000 \times Q$ . Will Sauron pay the fixed cost, build the ring forge, and enter the ring-making business? \_\_\_\_\_

**No. Profits are maximized making 11 rings at a margin of 88,000GP/ring; the 968,000GP in operating profit does not cover the fixed costs of 1,000,000GP**

Suppose that total lifetime demand for rings of power by elves, dwarves, and humans is given by:  $P = 100,000 - 2000 \times Q$ . Will Sauron pay the fixed cost, build the ring forge, and enter the ring-making business? \_\_\_\_\_

**No. Profits are maximized making 20 rings at a margin of 40,000GP/ring; the 800,000GP in operating profit does not cover the fixed costs of 1,000,000GP**

NAME:

**Section III: Macroeconomics (20 points/36 minutes):**

1. (2pts.) If the marginal propensity to consume is  $\frac{3}{4}$ , the multiplier is:

5 4 3 2 1

2. (2pts.) Suppose that in 2010 Camelot's GDP was 100, and that in 2015 Camelot's GDP was 150. To the nearest percent, Camelot's annual GDP growth rate is:

10% 5% 2% 8% 15%

3. (2 pts.) Suppose that Maria's consumption spending this year will be equal to \$40,000 plus  $\frac{2}{3}$  of whatever income she earns. This \$40,000 is her:

(planned expenditure)  
(marginal consumption)  
(expected consumption)  
(marginal propensity to consume)  
**(none of the above)**

4. (2 pts.) In the equation,  $C = c_0 + c_y \times Y$ ,  $c_0$  can be said to refer to the:

(marginal propensity to consume)  
**(degree of consumer confidence)**  
(disposable income)  
(total income)  
(animal spirits)

NAME:

5. (4 pts.: answer this with a few sentences—a very short paragraph) List each piece of information you would need to know (every term in the equation) to calculate the real interest rate and describe what each term means? (You don't need to write the Greek letters, you can just use words)

$$r = i + \rho + \tau - \pi$$

**$i$  — short-term safe nominal interest rate on U.S. Treasury debt—what the Federal Reserve controls; the FRBNY trading desk can make  $i$  whatever it wants...**

**$\rho$  — risk premium, how much extra financiers demand in order to hold risky debt issued by companies that might go bankrupt. Varies with financiers' perceptions of how risky the world is, the amount of risky debt issued by corporations, and the wealth and the taste for risk of financiers**

**$\tau$  — term premium, how much extra financiers demand in order to hold long-term rather than short term debt. The term premium will be high when financiers expect the Federal Reserve to raise  $i$  in the future. The term premium will be low or even negative when financiers expect the Federal Reserve to lower  $i$  in the future**

**$\pi$  — the (expected) inflation rate**

NAME:

6. (4 pts.) Suppose that it is December 2016 and you are called to Washington to audition for a cabinet-level post in the next administration and to advise him or her on the proper size of the economic stimulus program.

Your forecast is that, were 2018 to be a normal business-cycle time, that the level of real GDP in 2018 would be \$17.0 trillion/year. You are conducting your analysis in the income-expenditure framework where:

$$Y = E = C + I + G + X ,$$
$$C = c_o + c_y \times Y. \text{ You believe that } c_y = 0.5.$$

You project that there will be little change from trend in consumer confidence  $c_o$ , which you project at \$2.5 trillion/year in 2018. you project that business demand for investment spending will be \$3.5 trillion/year in 2018. You project that exports will be \$2 trillion/year in 2018. And you project that the Federal Reserve will not take additional steps to stimulate the economy.

What level of government purchases  $G$  do you recommend for 2018? \_\_\_\_\_

Suppose that the President-Elect's political advisors say that it is very important, politically, to cut government purchases. What do you say in response? \_\_\_\_\_

Suppose that the value of the euro collapses and suddenly drives up interest rate spreads, and leads you to forecast that  $I$  in 2018 will be not \$3.5 trillion but \$2.5 trillion. How do you change your recommendation for  $G$ ? \_\_\_\_\_

**Potential output is \$17 trillion/year.  $c_o + I + NX = \$8$  trillion/year. And the multiplier  $\mu = 2...$**

**Having  $G$  at \$0.5 trillion would get actual GDP to \$17 trillion.**

**Ask: "are they interested in making the country a prosperous place, or "winning the morning" with clever political strategery?", or something similar**

**That  $G$  should be boosted to be not \$0.5 but \$1.5 trillion**

NAME:

7. (4 pts.) Recall our aggregate demand equation:

$$Y = \mu[c_0 + I_0 + NX] + \mu G + \mu l_r \times r$$

where  $Y$  is GDP;  $\mu = 1/(1-c_y)$ , the inverse of one minus the marginal propensity to consume, is the multiplier;  $c_0$ ,  $I_0$ , and  $NX$  are the basic private-sector spending flows of autonomous consumption, baseline investment, and net exports driven, respectively, by consumer confidence (and wealth), by business-bank animal spirits, and by foreigners' decisions to purchase;  $G$  is our index of fiscal policy, which in this class we usually take to be government purchases;  $l_r$  is the interest-sensitivity of business investment spending to build productive capacity, and  $r$  is the long-term real risky interest rate at which businesses can tap into bank and other financial funding for their investment spending.

In this equation the effects of Federal Reserve policy on GDP are the result of the Fed's control over current and future values of the short-term safe nominal interest rate  $i$  influencing  $r$ , and then how changes in  $r$  change investment spending  $I$  and then how changes in investment spending  $I$  change real GDP  $Y$ . And that, indeed, is most of the effect of monetary policy on real GDP. But the FBAH textbook goes into much greater, and lectures and section exercises went into somewhat greater detail.

Please identify and discuss what are the various potential effects of raising/lowering the nominal interest rate are on the macroeconomy.

**A good answer would note that FBAH and the lectures discussed:**

**How a lower interest rate raises household wealth, and thus is likely to boost  $c_0$**

**How a stronger economy with a higher level of GDP is likely to produce a higher rate of investment spending as well, as more firms find themselves with no excess capacity at all, and so lower interest rates will boost  $I$  through this channel**

**How a lower interest rate reduces the value of the dollar. That makes U.S.-made goods more attractive to foreigners, and is likely to boost net exports as well.**

**All these channels are present, in addition to the direct one of the effect of interest rates on business investment spending**

## PART B

NAME:

GSI NAME:

SECTION TIME:

SECTION NUMBER

### Section IV: Political Economy/Long-Run Growth/International (20 pts./36 min.):

Remember the *Rule of 72*: the time it takes a quantity to double is roughly equal to 72 divided by the quantity's growth rate in percent per year...

1. (2 pts.) A tax that is meant to discourage negative externalities is called a:

- (Coaseian Tax)
- (Dasguptian surcharge)
- (Pigovian tax)**
- (Keynesian tax)
- (none of the above)

2. (2 pts.) The rationing function of price refers to how:

- (the price system distributes scarce goods to those who need them the most)
- (the price system distributes scarce goods to those who value them most highly)**
- (the price system directs resources away from overcrowded markets and towards markets that are underserved)
- (quotas can cause shortages)
- (none of the above)

3. (2 pts.) Suppose: In 2014, one donkey cost \$100. In 2016, one donkey cost \$121. What was the annual inflation rate between 2014 and 2016?

- 5%
- 8%
- 10%**
- 12%
- none of the above

NAME:

4. (2 pts.) Stabilization policies are

- (policies aimed at keeping farm commodity prices at their levels as of 1929)
- (policies that reduce negative externalities to the efficient amount through taxation)
- (government policy actions decided to reduce planned spending and output)
- (government policies used to shift aggregate demand to try to reduce output gaps)**
- (none of the above)

5. (4 pts.: answer this with a few sentences—a very short paragraph) Give an example of public, common, private and collective goods and explain why they are that type of good.

**Public good—national defense. Once it is bought, there is no way to exclude people from benefiting from it. Once it is bought, everyone automatically benefits from it.**

**Commons good—fisheries in international waters. There is no (direct) way to keep people from sailing on the seas in international waters and catching fish. But the fish stock is a common resource that is depletable, and depleted.**

**Private good—an apple. Only I can use it. It can't be duplicated except at the same cost as the first one was grown.**

**Collective good—access to Hulu's video library. There is no cost to providing access to another person. But it is easy to charge for access, and to prohibit those who have not paid from accessing...**

6. (4 pts.: answer this with a few sentences—a very short paragraph) Explain why we do not expect the free market to do a very good job producing and supplying public goods:

**How can you charge for it? People benefit from it whether or not they pay—trying to charge means that you are in essence running a tip- or patronage-based business. And why would you want to charge for it if you could? The marginal cost of supplying it to another person is zero. Charging a price is inconsistent with economic efficiency.**

NAME:

7. (4 pts.) There may have been as few as 740 humans surviving in the years after the catastrophic volcanic eruptions and Volcano Winters about 69,000 years ago. Assume there were so few. Now there are about 7.4 billion of us:

What multiple of human population 69,000 years ago is human population today? \_\_\_\_\_

About how many doublings has the growth of human populations over the past 69,000 years been? \_\_\_\_\_

About how long, on average, has it taken human populations to double over the past 69,000 years? \_\_\_\_\_

What has the average growth rate of the human population been, in percent per year, over the past 69,000 years? \_\_\_\_\_

**a multiple of 10,000,000**  
**about 23 doublings**  
**3000 years**  
 **$72/3000 = 24/1000 = 0.024\%/year$**

NAME:

**Section V: Essay 1 (20 pts./36 min.): Answer one of the following two questions:**

1. Suppose your roommate comes to you on May 8 and says that they have just learned that, even though they thought they had dropped Econ 1 before the semester began, they did not and are still enrolled in the course. They have done no reading, gone to no lectures, and done no problems. They say that they think they should take the exam on May 9 just in case they are unable to properly fix the bureaucratic mess-up, and that they have three hours that they can devote to study. They ask your advice. What do you tell them to study in their three hours? Why do you tell them that the things you pick out are the things to study?

2. Look back to the book or books you wrote your spring vacation paper about. To what extent has reading that book or those books affected your view of economics? How has it deepened, contradicted, or reinforced what you have learned in this course?

