SUID:

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Exam 1
Spring 2019

DO NOT OPEN THIS EXAM UNTIL YOU ARE TOLD TO DO SO.

Instructions

1. Write your SUID in the upper right corner of this exam. **DO NOT** write your name.

2. **SHOW ALL YOUR WORK**. Answers without supporting work will receive little or no credit.

3. There are 75 points possible on this exam and you will have 80 minutes to complete it. Be sure to budget your time accordingly.

4. You may write on the backs of pages, on the extra page at the end, or on extra sheets of paper but **BE SURE TO NOTE THAT NEAR THE QUESTION**.

5. If you use extra sheets of paper, please number them so you can do step 4 above.

Area of a triangle: $\frac{1}{2}bh$ Area of a trapezoid: $\left(\frac{b_1 + b_2}{2}\right)h$

Question 1 (30 points)

A good is purchased by households of types A and B and produced sellers of type C. Key information about each group is shown below.

Type	**Number**	**Curve**	**Income**
Individual type A buyer	40	$WTP_{Ai} = 200 - 0.5 * Q_{Ai}$	$40,000
Individual type B buyer	80	$WTP_{Bi} = 400 - Q_{Bi}$	$80,000
Individual type C seller	140	$WTA_{Ci} = Q_{Ci}$	n/a

(a) *15 points.* Please compute: ☐ the market equilibrium price and quantity; ☐ the quantity purchased by an individual A household; ☐ the quantity sold by an individual C seller; and ☐ illustrate the market equilibrium with an appropriate graph.

Question 1, continued

Now suppose the government is considering a $30 subsidy on the good and would like to know how the policy impacts sellers, and whether spending on the policy will be progressive or regressive. A subsidy is regressive if high income households receive a larger amount of the subsidy as a percent of their income than low income households.

(b) *15 points.* Please compute the following when the subsidy is imposed: ☐ the new buyer and seller prices; ☐ the new equilibrium market quantity; ☐ the new quantity purchased by an individual household of each of types A and B; ☐ the change in CS received by an individual A household; ☐ the change in PS received by an individual seller; ☐ the amount of spending on the subsidy received by an individual household of type A and B; and ☐ indicate whether the subsidy is progressive or regressive, including any necessary calculations.

Question 2 (15 points)

Suppose that two firms, C and R, supply a particular good. Firm C uses a conventional manufacturing process. It is producing 5000 units and its supply elasticity is known to be 2. Firm R uses recycled materials that would otherwise have gone into a landfill. It is producing 3000 units and has a perfectly elastic supply curve with $WTA_R = \$200$. The market price of the good is $200, a total of 8000 units are being purchased, and demand for the good is known to have an elasticity of -1.

Suppose that a study has concluded that keeping materials out of the landfill (that is, production by firm R) creates a positive externality of $20 per unit: $MB_{ext} = \$20$. As a result, a government agency is considering a new policy that would provide a $20 subsidy on each unit produced by R.

(a) *15 points*. Please determine the following: ☐ the new market price after the subsidy on R takes effect; ☐ the new total quantity consumed; ☐ the new quantity produced by C; ☐ the new quantity produced by R; ☐ the change in CS; ☐ the change in PS; ☐ the change in government revenue; ☐ the change in the externality; and ☐ the overall change in SS.

Question 3 (15 points)

A government is concerned that consumption of a particular good is harmful to the health of its users. It would like to discourage consumption by imposing a $3 tax on the good. The market WTP and WTA curves are given below. There are no taxes or subsidies currently in place.

$$WTP = 20 - 0.05 * Q$$
$$WTA = 5 + 0.1 * Q$$

(a) *15 points.* Please determine: ☐ the initial market equilibrium price and quantity in the absence of the tax; ☐ the new buyer and seller prices when the tax is imposed; and ☐ the new market quantity; ☐ the amount of government revenue raised by the tax; ☐ the percent of the tax burden falling on buyers; and ☐ the percent of the tax burden falling on sellers. Who bears the largest portion of the tax?

Question 4 (15 points)

A nonprofit organization runs a gym (think of the Y). It has two kinds of members: light users (L) who intend to exercise a lot but don't actually get around to it much, and heavier users (H) who are training more seriously and use the gym a lot. The L users are relatively inexpensive to serve because they don't require much staff time or cause much wear and tear on the equipment. The H users are much higher cost, but the organization is committed to charging both types the same price. The current price is $100 a month and the organization is running a deficit of $10,000. It also has the following information:

Variable	**L**	**H**
Current members	1000	400
Demand elasticity	-2	-1
Cost per member (WTA)	$80	TBD

The organization is considering raising the price to $110 in an effort to bring its budget back into balance.

(a) Please determine: ☐ the organization's extra revenue from the L members at the current $100 price; ☐ the organization's cost (WTA_H) of serving a type H member; ☐ the number of members of each type it would have if it raised the price to $110; and ☐ the new overall surplus or deficit resulting from the policy. What contributes more to addressing the budget problem: higher revenue from L or lower subsidies to H? Please be quantitative.

Additional page for calculations
If you use this, please remember to indicate near the question that part of the answer is here.