ECONOMICS 1A: PROBLEM SET 2

Answer Key

1. You are going to go to San Francisco for work purposes. The distance is 80 miles. You can drive or take the train. The cost of the train is $10, and the journey takes 2.5 hours. Your wage is $10 per hour. The cost of the car journey is $4 for gasoline, plus depreciation of your vehicle. The depreciation cost is $0.10 per mile. The car journey takes 1.5 hours.

(a) What is the opportunity cost of getting to the city under each mode?
   (1) Opp. cost of train: $10 (ticket) + 2.5 * $10 (lost wages) = $35
   (2) Opp. cost of car: $4 (gas) + $8 (depr.) + 1.5 * $10 = $27

(b) Which policy would be more effective at getting people to take the train – a 20% gas tax, or speeding up the train by 30 minutes?
   The change in the opportunity cost:
   (1) with a 20% gas tax: pay an extra $0.80 for gas
   (2) speeding up the train by 30 minutes: gain an extra $5 in wages
   Thus (2) is the more effective policy.

2. The table below shows the wages of high school graduates at different ages, the tuition cost of college, and the annual living expenses at each age which depends on gender and number of dependents.

(a) What is the opportunity cost of college for a 20-24 year old male with no dependents?

   $4,500 + $12,000 = $16,500  (The living expenses are not an opportunity cost.)

(b) Does the cost of college increase if the 20-24 year old has dependents? Explain.

   No, dependents only affect “living expense” which is not an opportunity cost. (The needs of your spouse and children do not change because you are in school.)
<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>Number of dependents</th>
<th>Tuition cost</th>
<th>Living expenses</th>
<th>Wage of high school graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-24</td>
<td>Male</td>
<td>0</td>
<td>$4,500</td>
<td>$10,000</td>
<td>$12,000</td>
</tr>
<tr>
<td>20-24</td>
<td>Male</td>
<td>2</td>
<td>$4,500</td>
<td>$12,000</td>
<td>$12,000</td>
</tr>
<tr>
<td>20-24</td>
<td>Female</td>
<td>0</td>
<td>$4,500</td>
<td>$9,000</td>
<td>$10,000</td>
</tr>
<tr>
<td>20-24</td>
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<td>2</td>
<td>$4,500</td>
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</tr>
<tr>
<td>40-44</td>
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<td>$4,500</td>
<td>$15,000</td>
<td>$20,000</td>
</tr>
<tr>
<td>40-44</td>
<td>Male</td>
<td>2</td>
<td>$4,500</td>
<td>$20,000</td>
<td>$20,000</td>
</tr>
<tr>
<td>40-44</td>
<td>Female</td>
<td>0</td>
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<td>Female</td>
<td>2</td>
<td>$4,500</td>
<td>$16,000</td>
<td>$16,000</td>
</tr>
</tbody>
</table>

(c) 40-44 year old males earn more than 20-24 year old males. Does that make college more expensive for them?

*Yes, (on average) they have greater opportunity costs associated with forgone wages.*

(d) Given the opportunity cost for males versus females, if the economic benefits of college were the same would you expect more women or more men to attend?

*Yes, since they earn less, they would have lower opportunity costs, and with the same incremental benefit as men, they are more likely to attend college (everything else being equal).*

3. The new toll bridge to Hades over the river Styx cost $10 m. to build and costs $1 m to maintain per year. It can carry up to 1,000 cars per hour. Suppose that maximum traffic flow is 500 cars per hour. What is the marginal cost of another car using the bridge? $0.0

Suppose the bridge had cost $20 m to build, would this change the marginal cost? No

4. Governor Davis, dazzled by the state budget surplus, constructs a 5 lane toll bridge to Hawaii at a cost of $1,000 billion which can carry 1,000 cars per hour. The interest cost on the expenditure is $50 billion per year. Once the bridge is built, it is found that the demand curve for the bridge (per hour) is as shown in the figure.

(a) What is the efficient toll price for the bridge? $0.0

(b) At the efficient price what is the total annual consumer surplus generated by the bridge? 

\[ CS = 21,915,000 \]

(c) If the toll is set at an efficient level was it efficient to have built the bridge? No

Explain using both sufficient conditions for efficiency given in class.
(1) Building the bridge does not maximize total surplus.
(2) Trades are possible: if the gov’t doesn’t build the bridge, they can use the money to compensate those who benefited from the bridge and still have money left over.

5. The market demand for lemons is \( Q_d = 100 - 4P \). The market supply is \( Q_s = 4P - 20 \).

(a) Draw the demand curve and supply curve on the same diagram.

(b) What is the equilibrium price and quantity of lemons? \( P^* = 15 \); \( Q^* = 40 \)
(c) What is the total consumer surplus at this price? \( 0.5 \times (25-15) \times 40 = 200 \)
(d) What is the total producer surplus? \( 0.5 \times (15-5) \times 40 = 200 \)
(e) What would be the cost to consumers in $ of a government ban on selling lemons? $200
What would be the cost to producers? $200 What would be the total social cost in $? $400

(f) Suppose that the government, to support Florida farmers, mandates a minimum lemon price of $20. What is the new consumer surplus and producer surplus? What happens to total surplus? \( CS_{\text{new}} = 50 \); \( PS_{\text{new}} = 250 \); \( TS_{\text{new}} = 300 \) ($100 loss in TS due to price support)

(g) Show on a diagram the area that corresponds to the loss of total surplus in (f).
In search of a way to fund his promised income tax reduction, and in the interest of family values, Republican Presidential candidate George Shrub proposes a “revenue enhancement” measure: a “fee” of $0.90 per bottle of beer. His opponent, John McClean, senses that this proposal may have offended Shrub’s “bubba” electoral base. He argues that it is unfair to penalize beer consumers, many of whom are vets from “Nam” trying to quiet the demons aroused by endless hours of kitchen duty in the National Guard. He would instead impose the fee only on he fat cat corporate liquor producers. 

(a) Suppose demand for beer is given by \( Q_d = 1,250 - 125P \), and supply is given by \( Q_s = 1,000P - 1,000 \), where \( P \) is in $. What is the pre-tax equilibrium price and quantity? 
\[
P^* = 2 \\
Q^* = 1000
\]

(b) If the fee of $0.90 is imposed on the consumers what is the new demand curve? What is the new equilibrium price and quantity? What is the amount of tax revenue? 
\[
\text{New } Q_d = 1250 - 125(P+T) = 1250 - 125P - 112.5 = 1137.5 - 125P \\
P^*_{\text{new}} = 1.9 \\
Q^*_{\text{new}} = 900 \\
\text{Tax Rev.} = .9 * 900 = 810
\]

(c) If the fee of $0.90 is imposed on the producers, what is the new supply curve? What is the new equilibrium price and quantity? What is the amount of tax revenue? 
\[
\text{New } Q_s = 1000(P - T) - 1000 = 1000P - 900 - 1000 = 1000P - 900 \\
P^*_{\text{new}} = 2.8 \\
Q^*_{\text{new}} = 900 \\
\text{Tax Rev.} = .9 * 900 = 810
\]

(d) How much of the tax is paid by the consumer under each proposal?
Consumers pay $720 ( = $0.80 * 900) of the tax under both proposals.

(e) What is the loss of total surplus (in $) from each tax?
   Loss in TS = $45  \textbf{(same for both tax schemes)}

(f) Kurt Vile, fresh from Econ 1 class, suggests that Shrub should instead tax insulin, since the demand curve for insulin is inelastic at $Q_d = 900$. What is his rational? What is the net social savings from Kurt’s proposal in $?
   \textbf{Kurt’s rational is to minimize deadweight loss.}
   \textbf{Net social savings = $45}