ECONOMICS 1A: PROBLEM SET 3

Opportunity Costs

1. You commute to San Francisco for work purposes. The distance is 75 miles. You can drive or take the train. The train ticket is $25, and the journey takes 2 hours. Your wage is $20 per hour. The cost of the car journey is $10 for gasoline, $4 for tolls, plus a depreciation cost of $0.20 per mile for your vehicle. The car journey takes 1.5 hours.

   (a) What is the opportunity cost in $ of getting to the city under each mode (compared to not going)?

       TRAIN = 25 + 2 \times 20 + = $65  
       AUTO = 10 + 4 + 15 + 1.5 \times 20 = $59

   (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?

       GAS TAX → Increase in auto opportunity cost of $2
       FASTER TRAIN → Decrease in train opportunity cost of $10
       Faster train more effective

   (c) Free wireless was just introduced on the train. How might this affect the relative opportunity costs?
       By allowing more people to work on the train it will substantially reduce the opportunity cost of train travel for them.
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.

<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>$9,000</td>
<td>$16,000</td>
<td>$24,000</td>
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<tr>
<td>20-24</td>
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<td>$9,000</td>
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<td>$24,000</td>
</tr>
<tr>
<td>20-24</td>
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<tr>
<td>20-24</td>
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<td>40-44</td>
<td>Female</td>
<td>2</td>
<td>$9,000</td>
<td>$32,000</td>
<td>$32,000</td>
</tr>
</tbody>
</table>

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

**OPPORTUNITY COST = $9,000 + $24,000 = $33,000** (assuming living expenses are the same at college as not attending college).

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

**NO – dependents have to be provided for whether or not at college.**

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

**YES**

(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?

**MORE WOMEN**

(e) Many Division 1 college athletes, even though on full scholarship, leave college before completing their degrees. Explain this in terms of opportunity costs.

**If they can get a professional contract then their opportunity cost of staying in college becomes very high.**
(f) Explain in terms of opportunity costs why private colleges and universities do not suffer much income loss in times of unemployment.

When the alternative to college is unemployment, the opportunity cost declines sharply.

Marginal Costs and Efficiency

3. The new toll bridge to Hades over the river Styx cost $10 m. to build, with an annual interest cost on the money of $0.5 m, and costs a further $0.5 m to maintain per year (irrespective of usage). It can carry up to 1,000 cars per hour. Suppose that maximum traffic demand, at zero toll cost, is 500 cars per hour. Suppose annual total demand for the bridge is as portrayed in the figure.

(a) Assuming the operator can charge only one toll, can the bridge cover its annual costs?

The maximum revenue will be at a price of $3 (by trial and error). This generates $750,000 per year, which is less than the annual cost.

(b) Is it efficient to build the bridge? Explain.

It is efficient to build the bridge. When the price is set at the marginal cost (=0), the total consumer surplus generated by the bridge per year is $1.5 m., which is greater than the annual cost of the bridge.

(c) What is the efficient toll?
P = MC = 0

(d) Since operation of the bridge requires a subsidy from the public, what assumption does you answer in (b) make about the costs of raising tax revenue?

That the cost of raising $1 m. per year in tax revenue is less than $0.5 m.