1. (10 points) Your Aunt Sue is an environmental fanatic. She loves clean air and, literally, hugs trees. She has recently been organizing a campaign to make all pollution illegal. Write a short e-mail message in language that any aunt or uncle would be able to understand, explaining why it would not be socially efficient to try to eliminate all pollution. (For full credit, your answer should demonstrate understanding of the first equimarginal principle, without using any technical language)

Dear Aunt Sue,

1. Is the e-mail message written in every-day language /2
2. Is it clear that social net benefits are considered /2
3. Are marginal concepts used correctly to explain that the marginal cost of abatement will be greater than the MB when pollution is pushed to 0? /3
4. Is the intuition behind the 1st equimarginal principle communicated? 3 /10

2. (10 points) Two part question

a. (6 points) RAT repeat: Suppose that I am willing to pay $400 for anti-lock brakes that reduce my chance of dying in a car accident from 9 in 10,000 (0.0009) to 5 in 10,000, (0.0005). Based on this choice, what would be an estimate of the minimum value that I place on a statistical life? (Do not give the final answer, simply write down the equation that you would enter into a calculator)

2.a Correct answer is $400/0.0004=$1,000,000
1. Is $500 in the numerator? /3
2. Is a probability placed in the denominator? /1
3. Is 0.0004 in the denominator? /2

b. (3 points) Using the information from part a, estimate the minimum amount that I would be willing to pay to eliminate of a toxic chemical from air emissions if eliminating the chemical led to a decline in mortality risk by 2 in 100,000 (0.00002) (You do not need to give the final answer, simply write down the equation)

2.b Correct answer:
1. If V is the answer from a, then V×0.00002 is the answer here.
2. = ($400/0.0004)×0.00002=$20.
3. Is the answer a smaller number than the answer to a, this shows minimal intuition. /1
4. Is answer given here 0.00002 times answer to part a? /2
3. (5 points) RAT repeat: In the figure above, what is the efficient allocation when $S_T$ represents the total amount of water available to users A and B?

3. For full credit $Q_A= 0 \quad & \quad Q_B= 2 \Rightarrow 5$ points

| Partial credit - Does the total consumption sum to 2? | /2 |
| Partial credit - Is the $\text{MNB}_A=\text{MNB}_B$ at the allocation indicated | /2 | /5 |

4. (10 points) Population

a. (4 points) In the graph below, draw the two lines that are used in the microeconomic model that explains how families make choices regarding how many children to have. Be sure to label your curves.

4.aMC

| Downward sloping curve labeled WTP, MWTP or D | /2 | /4 |

b. (6 points) Explain how this model can be used to represent the changing rates of population growth as an economy develops and becomes more urbanized.
4.b. Mentions at least one of the curves shifting, MC up or D down. /3
A plausible explanation why at least one of the lines would shift as an economy develops and/or becomes more urbanized /3 /6

5. (5 points) Suppose a city charges all households an annual fee of $120 to cover the cost of garbage disposal.
   a. (2 points) *RAT repeat* For a household that generates on average 1,200 pounds of garbage per year, what is the household’s marginal cost of disposal? /2
   b. (3 points) Suppose the cost to city to dispose of waste is $0.10 per pound. Based on economic theory, explain why you would expect that their current pricing system would or would not lead to the socially efficient quantity of waste? /2 /3

5.a $0 (I can’t think of a partial credit scenario) /2 /2
5.b No, it would not
   Should mention that households will throw out trash until their MB=0, which means that they will throw out trash even if the MB to them is less than the MC to the city. Mention of welfare cost would also be sufficient. /1 /2 /3

6. (15 points) The graph below represents the benefits and costs of using a non-renewable resource immediately and one period in the future. The discount rate is 10%.

![Graph](image)

a. (3 points) What is the present value of the net benefits of the first unit used next period? (Calculations should be simple, but if you need a calculator, simply write down what you would have entered into a calculator)

6.a Answer: $100 = $110/1.1 ⇒ 3 points

   $110 in the numerator /1
   1.1 in the denominator /2 /3

b. (7 points) Suppose there are 4 thousand units of the resource that must be shared between this period and next period. At the efficient allocation, would more be consumed this period or next period? Explain your answer using intuition, math, or both.

6.b More this period /2
Solid economic intuition that captures the idea that the MNB today should equal the PV of the MNB in the future. This will only occur if the consumption next period is less than consumption this period

c. Suppose that the efficient allocation is such that 3 thousand units are consumed this period. What would be the market price this period? What would be the market price next period? (write down equations or describe intuition if exact numbers are not obvious).

6.c This period’s price would be $60 (1 point for $50)

Intuition: Next period’s price would be higher so that the PV(MNB₁) = 50
Math P₁ = 50 × 1.1 + 10 = 65 [2 points for 66 (P₀ × 1.1)]

7. (15 points) The graph below is taken from a study of fishing in Costa Rica. The numbers on the graph indicate estimates of the actual effort and revenue that were achieved by the fishery over the 1970-1988 period.

![Graph of Revenue and Costs](image)

a. (4 points) In approximately what year did the fishery have the economically optimal level of fishing effort? Explain

7.a Any answer in the 1978-1982 period (2 points)
This maximizes net revenue, profits, or sustainable profits.

b. (4 points) Using economic intuition, why do you think effort continued to increase over time?

7.b Does the answer show an understanding of the tragedy of the commons, i.e. that profits continue to be possible for new entrants until revenue = cost?

7.c. (6 points) Describe a policy that might have been used to reduce fishing effort, but would have left the fishermen no better off in the long run? Explain why fishermen would have been no better off.

7.c. Any policy that raises cost – gear restrictions, tax on effort, tax on harvests, season limits, etc.

Does the answer make clear that the tragedy of the commons remains
Clippings Questions

Your answers to these should be well written paragraphs, that
(1) **show that you understand all the underlined concepts,**
(2) Be sure to **apply the economic concepts** to the context of the article, and
(3) as appropriate, **use details from the article** in your argument.

8. (10 points) The socially efficient landfill height.
   a. On the graph below, propose a graphical model that can be used to help describe the
      landfill problem described in the first article, capturing the benefits to the landfill owner
      and the costs to the community. In your model, assume that original proposal for the
      landfill was **not** socially efficient. (Be sure to label any curves you draw and, as
      necessary, describe them)

<table>
<thead>
<tr>
<th>8.a MB curve</th>
<th>/1</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC Curve</td>
<td>/1</td>
</tr>
<tr>
<td>MB curve is downward sloping</td>
<td>/1</td>
</tr>
<tr>
<td>MC curve is upward sloping or horizontal</td>
<td>/1</td>
</tr>
<tr>
<td>Intersection is identified to the left of 111 feet</td>
<td>/1</td>
</tr>
</tbody>
</table>

b. Describe in words why an inefficiency might arise without intervention, including an
   explanation of which **characteristic of efficient property rights** is not satisfied?

| 8.b At least one characteristic of efficient property rights is mentioned: exclusivity, enforceability, transferability | /1 |
| Exclusivity is identified as the right that is not satisfied | /1 |
| Appropriate connection to facts in the article | /2 |
| Correct explanation of how this results in inefficiency | /1 |

$\$/foot of height

Height (feet)
9. (10 points) Explain how the negotiation process in which a payment was made to the community could lead to a **socially efficient outcome**. (Hint: Coaseian bargaining) You may assume that the community initially had the right to block the landfill.

To be precise, you may want to refer to your graph from 8. If you make changes in the graph, be sure to label them carefully and refer to those changes here.

<table>
<thead>
<tr>
<th>Question</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the answer provide clear evidence that the student understands what social efficiency means?</td>
<td>3</td>
</tr>
<tr>
<td>Does the answer incorporate details from the article(s)</td>
<td>2</td>
</tr>
<tr>
<td>Is the role of payment in achieving a socially efficient outcome clear</td>
<td>3</td>
</tr>
<tr>
<td>Is the principle of Coaseian bargaining brought out?</td>
<td>2</td>
</tr>
</tbody>
</table>

10. Suppose that this landfill project had actually been considered for many years, but the operator only decided to pursue it when the new biocorridor was approved. Explain the concept of **quasi-option value** and discuss how this concept might have applied in this case.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Is there attention to the idea of uncertainty being resolved?</td>
<td>3</td>
</tr>
<tr>
<td>Is there attention to the choice being made after uncertainty is resolved?</td>
<td>3</td>
</tr>
<tr>
<td>Is the paragraph well written</td>
<td>2</td>
</tr>
<tr>
<td>Are details from the article incorporated into the answer?</td>
<td>2</td>
</tr>
</tbody>
</table>

/10
Clipping- Two articles

First Article Based on “Residents opposing planned landfill meet ahead of hearing”
By Brooke West, TheEagle.com

Dozens of community members' feelings about a proposed 111-foot-tall landfill were emblazoned on a bright red background during a meeting Tuesday of the Concerned Citizens for Safety, Health and Justice: "Tower of Trash ... Coming Soon to Your Front Yard."

About 60 residents of an area known colloquially as Brushy -- just outside of the College Station city limits -- gathered at Hope Evangelical Free Church to discuss an upcoming hearing regarding a landfill proposed for a 32-acre area to be built just outside the community’s entrance.

A range of issues trouble the community including whether or not the landfill will affect groundwater and surface water, if existing roads are adequate for increased traffic, and if the permit includes adequate provisions for dust nuisances.

"We still believe there is a huge issue of environmental injustice," Gage said. "The normal public would not have that kind of threat proposed on them."

The landfill is expected to reach a height of 111 feet in about 30 years. Area residents fear the landfill will diminish their quality of life as well as their property values.

Argie Butler has been a resident of Brushy all her life described her concerns, "With the dust and the particles, we have this high wind, and, for some reason, I guess people are not thinking. It's not just going to stay out here in Brushy ... It seems like so much is set up to look after the business side of things instead of the human side, the personal side. Because when you're dealing with people and you're trying to fight people with the money, the money seems to always win."

Second Article: Based on “Landfill plans moving forward after deal” 4/25/2013
By Allen Reed TheEagle.com

A controversial proposal to construct a landfill near College Station is moving forward after the operator of the proposed facility reached an agreement with nearby residents.

The 32-acre Brazos Valley Disposal Facility (BVDF) and would collect material from demolition and construction sites. It is strategically located near the new biocorridor on the west side of the A&M campus, where numerous buildings will be constructed over the next decade.

To reach the agreement and end the dispute, the scope of the project has changed -- most notably its size. The parties agreed that the landfill will peak at 75 feet, which is down from the 112 feet originally proposed, said John Bounds, a coordinator for the opposition group Concerned Citizens for Safety, Health and Justice. Other concessions include increased landscaping, such as shrubbery to shield the landfill from nearby homeowners, and requirements that trucks carrying the waste lower the sound they make when reversing.

The Brushy community will also receive a number of benefits. The community association will be paid $25,000 up front from Mancuso and an additional $5,000 a year for four years. The landfill owner will pave the road that will be the new gateway into the Brushy community, and the landfill will provide compost in bulk to the Brushy community for annual landscaping of churches or its cemetery.

Both representatives of the community and BVDF management agreed that the mediation was successful. "It was just a good mediation. We’re glad we worked together on this."