Unit 14 - Week 11: Externality and Linear Programming

Assignment 11

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

1. The existence of positive externality will cause mass allocation of resources at free market price. As there is:

   - Decrease demand
   - Over production
   - Under production

   No, the answer is incorrect. Score: 0

   Accepted Answers:
   - Under production

2. An social optimum point of resource allocation:

   - Price = Marginal private cost
   - Price = Average cost
   - Price = Marginal social cost

   No, the answer is incorrect. Score: 0

   Accepted Answers:
   - Price = Marginal social cost

3. The ABC gas company supply gas to the city household through underground pipelines. Every year, the company has to bear $50 for the maintenance of point of three pipes. The maintenance has two effects - first it reduces the amount of low gas which cost $7 per 100 and second less damage to the land above the pipelines which is given by $3 per 100. What is the socially optimal level of maintenance (X) for the company?

   \[
   X = 0
   \]

   Accepted Answers:
   - X = 2

4. A coal-based power plant operates near to the city M and produce electricity for the city. However, during the process of electricity generation, the power plant emits 800 in the air. The total cost of emissions abatement is given by 200 + X and total benefit of emission abatement to 1000 when it indicates the total unit of 800 abated by the power plant. Compute the socially optimal level of abatement for the power plant.

   \[
   X = 5
   \]

   Accepted Answers:
   - X = 2

5. A paint company produces two types of paint – exterior (X1) and interior (X2) with two raw materials, M1 and M2. Following table provides price information regarding raw materials usage and profit per unit of paints

<table>
<thead>
<tr>
<th>Raw material usage per unit</th>
<th>Maximum daily availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>6</td>
</tr>
<tr>
<td>M2</td>
<td>4</td>
</tr>
<tr>
<td>M3</td>
<td>2</td>
</tr>
<tr>
<td>Cost</td>
<td>Profit per unit of paint</td>
</tr>
<tr>
<td>0.90</td>
<td>5</td>
</tr>
<tr>
<td>0.60</td>
<td>7</td>
</tr>
<tr>
<td>0.60</td>
<td>9</td>
</tr>
</tbody>
</table>

   However, market survey indicates that daily demand for interior paint cannot exceed demand for exterior paint by more than 1 and maximum daily demand for interior paint is 2 units. If the paint company wants to maximize its total daily profit, then determine the optimal mix of exterior and interior paints for the company.

   \[
   X_1 = 3 + 2X_2 \leq 1.5
   \]

   \[
   X_1 + 1 < 2X_2 + 2
   \]

   No, the answer is incorrect. Score: 0

   Accepted Answers:
   - X_1 = 2 and X_2 = 1

6. A puffy firm uses of least 800 grams of a special food daily to feed its animals. The special food is a mixture of corn and soybeans with the following protein composition:

   | Grams of protein | Corn | Soybeans
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>0.90</td>
<td>0.60</td>
</tr>
<tr>
<td>Fat</td>
<td>0.60</td>
<td>0.90</td>
</tr>
<tr>
<td>Cost (per gram)</td>
<td>0.90</td>
<td>0.50</td>
</tr>
</tbody>
</table>

   The daily requirement of special food is at least 50% protein and 25% fat. Given this information, determine the daily minimum cost for the special food.

   \[
   \begin{align*}
   X_1 & \geq 0.5 \times 800 \\
   X_2 & \geq 0.25 \times 800 \\
   X_1 + X_2 & \leq 800
   \end{align*}
   \]

   No, the answer is incorrect. Score: 0

   Accepted Answers:
   - All constraints including non-negative constraints

7. Feasible region is the common region determined by

   \[
   \text{All constraints including non-negative constraints}
   \]

   No, the answer is incorrect. Score: 0

   Accepted Answers:
   - All constraints excepting non-negative constraints

8. Suppose in a linear programming problem, we have 3 constraints but number of parameters to be optimized is 4 then

   - The objective function can be optimized
   - The constraints are short in number
   - The solution depends on the type of problem
   - No, the answer is incorrect. Score: 0

   Accepted Answers:
   - The constraints are short in number