1. Consider the market for fire extinguishers.
   a. Is a fire extinguisher a positive or negative externality? Explain...
   b. Diagram the market for fire extinguishers, labeling the supply curve, demand curve, and the socially responsible outcome.
   c. If the government decides to internalize the externality, what type of government policy should they impose to get a socially responsible outcome?

(a.) **Positive Externality**: Fire extinguishers positively impact our society. In the event of a fire, owners of a fire extinguisher would be able to assist those who do not own a fire extinguisher.

(b.)

\[ P_1 \quad P_2 \]
\[ Q_1 \quad Q_2 \]

Price of fire extinguishers

\( Q_1 = \) efficient outcome

\( Q_2 = \) socially responsible outcome

(c.) Internalizing an externality involves altering incentives so that people take into account of the external effects of their actions.

(+) government can subsidize the production of fire extinguishers, through rebates in order to stimulate demand.
2. This problem is a combination of many topics coming from chapters 10 to 15.
   a. Excessive fishing occurs because each individual fisherman has little incentive to maintain the species for the following year. The fish in the ocean can be considered which type of good, private, public, common resources, or natural monopoly? When describing which type of good, be sure to specify if fish are rival and/or excludable. How can governments solve this problem and why do some of these solutions fail?
   
   b. Bob’s lawn-mowing service is a profit-maximizing, competitive firm. Bob mows lawns for $30 each. His average total cost is $25 and his average fixed cost is $5. He mows 10 lawns a day. What can you say about Bob’s short-run decision regarding shut down and his long-run decision regarding exit?

   c. It is projected that Social Security expenditures will increase dramatically while Social Security tax revenues will stay the same. If you were a policymaker working for the federal government what would you suggest to solve this problem aside from decreasing benefits and raising taxes?

(a.) common resources: Why? Fish are rival because it diminishes someone else’s fishing. It is non-excludable because unless the government applies a corrective tax or issues tradable permits, the government can not prevent someone from fishing.  

(b.) $$P < AVC$$ shut down in short-run.  

$$P > AVC$$ stay open $$P > ATC$$ stay open in long-run.  

(c.)$$P < ATC$$ exit market in long-run. 

$$P > ATC$$ increase retirement age, increase inheritance.
3. An industry currently has 100 firms, all of which have fixed costs of $16 and all of which possess the following information:

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Variable Cost</th>
<th>Total Cost</th>
<th>Marginal Cost</th>
<th>Marginal Revenue</th>
<th>Average Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>17</td>
<td>1</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>20</td>
<td>3</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>25</td>
<td>5</td>
<td>10</td>
<td>8.33</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>32</td>
<td>7</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>25</td>
<td>41</td>
<td>9</td>
<td>10</td>
<td>8.2</td>
</tr>
<tr>
<td>6</td>
<td>36</td>
<td>52</td>
<td>11</td>
<td>10</td>
<td>8.67</td>
</tr>
</tbody>
</table>

a. According to this table, what is the total quantity supplied to maximize profits? Is this a competitive firm or a monopoly? Must explain to get full credit...

b. Do these firms experience economies of scale or diseconomies of scale? Must explain to get full credit...

c. As this market makes a transition to its long-run equilibrium, will the price rise or fall? Explain...

(a.) Set $MC = MR \Rightarrow Q = 5 \times 100 = 500$

competitive Why? 100 firms or $MR$ is constant.

(b.) A Econ. of scale $ATC$ falling while $Q$ increases

B Disecon. of scale $ATC$ increasing while $Q$ increases.

(c.) $P > ATC$ ... As a result, some firms will enter the market, driving $prices$ downwards towards $zero$ profit.
4. A publisher faces the following demand schedule for the next novel of one of its popular authors. The following table shows revenue and costs.

<table>
<thead>
<tr>
<th>Price (1000s)</th>
<th>Quantity</th>
<th>Total Revenue</th>
<th>Marginal Revenue</th>
<th>Total Cost</th>
<th>Marginal Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>90</td>
<td>100</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>80</td>
<td>200</td>
<td>16</td>
<td>7</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>70</td>
<td>300</td>
<td>21</td>
<td>5</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>60</td>
<td>400</td>
<td>24</td>
<td>3</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>50</td>
<td>500</td>
<td>25</td>
<td>1</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>40</td>
<td>600</td>
<td>24</td>
<td>-1</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>30</td>
<td>700</td>
<td>21</td>
<td>-3</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>800</td>
<td>16</td>
<td>-5</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>900</td>
<td>9</td>
<td>-7</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>1000</td>
<td>0</td>
<td>-9</td>
<td>12</td>
<td>1</td>
</tr>
</tbody>
</table>

a. What quantity would a profit-maximizing publisher choose? What price would it charge?
b. Graph the marginal-revenue, marginal-cost, and demand curves. In your graph, shade in the deadweight loss.
c. Why can't competitive firms price discriminate like monopolies? Describe the meaning of perfect price discrimination and give an example...

\[
\begin{align*}
\text{(a.) profit maximizing monopolist would choose} \\
\text{MC = MR} \\
\text{Q = 500 (in thousands)}
\end{align*}
\]

\[
\begin{align*}
\text{(b.)}
\end{align*}
\]

\[
\begin{align*}
\text{(c.) monopolist is one price maker, competitive firms are price takers.}
\end{align*}
\]

Perfect Price Discrimination: every customer gets charged a different price. Thus, consumer surplus & deadweight have been both converted into profit.

Airline charges different prices at different times of day, so on...
This problem is a combination of many topics coming from chapters 10 to 15.

a. In the recent issue of *Atlantic*, the author discusses the possibility of eliminating the deduction for mortgage interest. If the government decided to eliminate mortgage interest deductions, what would you expect the likely effect on taxpayer behavior to be? Discuss the pros and cons of the deduction from the standpoint of vertical & horizontal equity.

b. National Defense can be considered which type of good: Private good, public good, common resources, or natural monopoly. When describing which type of good, be sure to specify if National Defense is a rival and/or excludable.

c. Command-and-control approaches often rely on uniform reductions among firms. Why are these approaches generally unable to target the firms that should undertake bigger reductions?

(a) Vertical equity - taxpayers with greater ability pay larger amounts.

Horizontal equity - taxpayers with similar abilities pay the same amount of taxes.

If the government eliminates the mortgage interest deductions, individuals with houses will not be able to reduce their taxes, thus improving vertical & horizontal equity. Rich people will not be able to get large deductions from their large houses, improving vertical equity. In terms of horizontal, this will also improve by similar individuals will pay the same amount of taxes.

(b) National Defense => public good

not rival => adding one person will not diminish another's use

non-excludable => you can't exclude someone from using National Defense.

(c) If firms rely on uniform reductions then it gives no incentive to reduce pollution beyond the mandated amount and no more.