Answers
1. Zoe is trying to decide how to divide her time between her job as a wedding photographer, which pays $27 per hour for as many hours as she chooses to work, and as a fossil collector, in which her pay depends both on the price of fossils and the number of them she finds. Earnings aside, Zoe is indifferent between the two tasks, and the number of fossils she can find depends on the number of hours a day she searches, as shown in the table below:

<table>
<thead>
<tr>
<th>Hours per day</th>
<th>Total fossils per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>15</td>
</tr>
</tbody>
</table>

Wedding photographer or fossil collector?

a. If the price of a fossil is less than $6, Zoe should devote all her time to photography because when the price is, say, $5 per fossil, an hour spent looking for fossils will give her 5($5) = $25, or $2 less than she’d earn doing photography. If the price of fossils is 6, Zoe should spend one hour searching, will supply 5 fossils, and will get $30 revenue, which is $3 more than she would earn from photography. However, an additional hour would yield only 4 additional fossils or $24 additional revenue, so she should not spend any further time looking for fossils. If the price of fossils rises to $7, however, the additional hour gathering fossils would yield an additional $28, so gathering fossils during that hour would then be the best choice, and Zoe would therefore supply 9 fossils per day. Using this reasoning, we can derive a price-quantity supplied relationship for fossils as follows:

a. Derive a table with price in dollar increments from $0 to $30 in the first column and the quantity of fossils Zoe is willing to supply per day at that price in the second.

<table>
<thead>
<tr>
<th>Price of fossils ($)</th>
<th>Number of fossils supplied per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>7, 8</td>
<td>9</td>
</tr>
<tr>
<td>9-13</td>
<td>12</td>
</tr>
<tr>
<td>14-26</td>
<td>14</td>
</tr>
<tr>
<td>27+</td>
<td>15</td>
</tr>
</tbody>
</table>

b. Plot these points in a graph with price on the vertical axis and quantity per day on the horizontal. What is this curve called?

When we plot the points from the table we derived in (a), we get Zoe’s daily supply curve for fossils:
2. A price-taking firm makes air conditioners. The market price of one of their new air conditioners is $120. Its total cost information is given in the table below:

<table>
<thead>
<tr>
<th>Air conditioners per day</th>
<th>Total cost ($ per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>150</td>
</tr>
<tr>
<td>3</td>
<td>220</td>
</tr>
<tr>
<td>4</td>
<td>310</td>
</tr>
<tr>
<td>5</td>
<td>405</td>
</tr>
<tr>
<td>6</td>
<td>510</td>
</tr>
<tr>
<td>7</td>
<td>650</td>
</tr>
<tr>
<td>8</td>
<td>800</td>
</tr>
</tbody>
</table>

How many air conditioners should the firm produce per day if its goal is to maximize its profit?

The marginal cost of each of the first 6 air conditioners produced each day is less than $120, but the marginal cost of the 7th air conditioner is $140. So the company should produce 6 air conditioners per day.
<table>
<thead>
<tr>
<th>Air conditioners per day</th>
<th>Total cost ($ per day)</th>
<th>Marginal cost ($/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>150</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>220</td>
<td>70</td>
</tr>
<tr>
<td>4</td>
<td>310</td>
<td>90</td>
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<tr>
<td>5</td>
<td>405</td>
<td>95</td>
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<tr>
<td>6</td>
<td>510</td>
<td>105</td>
</tr>
<tr>
<td>7</td>
<td>650</td>
<td>140</td>
</tr>
<tr>
<td>8</td>
<td>800</td>
<td>150</td>
</tr>
</tbody>
</table>

3. For the pizza seller whose marginal, average variable, and average total cost curves are shown in the accompanying diagram, what is the profit-maximizing level of output and how much profit will this producer earn if the price of pizza is $2.50 per slice?

This producer will sell 570 slices per day, the quantity for which $P = MC$. Its profit will be $(P - ATC)(Q) = (\$2.50/\text{slice} - \$1.40/\text{slice})(570 \text{ slices/day}) = \$627/\text{day}$. 