5.5 The Fundamental Theorem of Calculus

Example 1. The marginal cost $C'(q)$ of making T-shirts is shown below. Suppose that the fixed cost is $100.

<table>
<thead>
<tr>
<th>$q$</th>
<th>0</th>
<th>20</th>
<th>40</th>
<th>60</th>
<th>80</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C'(q)$ (MC)</td>
<td>10</td>
<td>4.67</td>
<td>3.95</td>
<td>3.58</td>
<td>3.33</td>
<td>3.15</td>
</tr>
</tbody>
</table>

(a) Estimate the total cost of making 60 T-shirts.
(b) What is the total variable cost of making 60 T-shirts?
(c) Estimate the difference in cost between making 60 T-shirts and 100.
Example 2. (Hughes-Hallett, 3e, 5.5#8) The marginal cost function of producing $q$ mountain bikes is

$$C'(q) = \frac{600}{0.3q + 5}.$$ 

(a) If the fixed cost in producing the bicycles is $2000, find the total cost to produce 30 bicycles.

(b) If the bikes are sold for $200 each, what is the profit (or loss) on the first 30 bicycles?

(c) Find the marginal profit on the 31st bicycle.