Q1: You must show the necessary and sufficient calculations needed to determine the correct answer. Find the absolute maximum and absolute minimum values of the function $f(x) = x^2 + 4x - 3$ on the interval $[-4, 1]$. Given: $f(x)$ has one critical value, $x = -2$

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x) = x^2 + 4x - 3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>$16 - 16 - 3 = -3$</td>
</tr>
<tr>
<td>-2</td>
<td>$4 - 8 - 3 = -7$</td>
</tr>
<tr>
<td>1</td>
<td>$1 + 4 - 3 = 2$</td>
</tr>
</tbody>
</table>

Absolute minimum value is $-7$ at $x = -2$ & absolute maximum value is $2$ at $x = 1$

Q2: Use the given info & the Second Derivative Test to determine if $f(x)$ has a local min or max at $x = 1$.

Given: The first derivative of $f(x)$ is $f'(x) = 12x^3 - 15x^2 + 3$

$f'(1) = 12 - 15 + 3 = 0$

$f''(x) = 36x^2 - 30x$

$f''(1) = 36 - 30 = 6$

$f(x)$ is concave up at $x = 1$ ⇒ local minimum at $x = 1$

Q3: A company manufactures and sells $x$ microwaves per week. The weekly Revenue and Cost functions are:

$R(x) = 300x - 0.25x^2$ and $C(x) = 2000 + 160x$

A. Find the maximum revenue and the production level at which it occurs.

$R'(x) = 300 - 0.5x$

$0 = 300 - 0.5x$

$0.5x = 300$

$x = 600$ microwaves.

$R(600) = 300(600) - 0.25(600)^2$

$= 150,000 - 90,000$

$= 60,000$

B. What is the price-demand function? $p = \frac{300 - 0.25x}{x}$

$R(x) = x \cdot p = 300x - 0.25x^2$

$= x(300 - 0.25x)$

C. What is the total Profit function? $P(x) = 140x - 0.25x^2 - 2000$

$R(x) - C(x) = 300x - 0.25x^2 - (2000 + 160x)$

$= 140x - 0.25x^2 - 2000$
Q1: You must show the necessary and sufficient calculations needed to determine the correct answer. Find the absolute maximum and absolute minimum values of the function \( f(x) = x^2 + 4x - 3 \) on the interval \([-4, 1]\). Given: \( f(x) \) has one critical value, \( x = -2 \) (you do not need to show this).

Absolute minimum value is _____ at \( x = \) ____ & absolute maximum value is _____ at \( x = \) ____

Q2: Use the given info & the Second Derivative Test to determine if \( f(x) \) has a local min or max at \( x = 1 \). Given: The first derivative of \( f(x) \) is \( f'(x) = 12x^3 - 15x^2 + 3 \) and \( f'(1) = 0 \).

Q3: A company manufactures and sells \( x \) microwaves per week. The weekly Revenue and Cost functions are:

\[
R(x) = 300x - 0.25x^2 \quad \text{and} \quad C(x) = 2000 + 160x
\]

A. Find the maximum revenue and the production level at which it occurs.

B. What is the price-demand function? \( p = \) _______________

C. What is the total Profit function? \( P(x) = \) _______________