7. [10 points] Let \( N(u) = \begin{cases} 
3 + 3u^2 + k & \text{if } u < 1 \\
5 \ln(e + u - 1) & \text{if } u \geq 1 
\end{cases} \) where \( k \) is a constant.

a. [6 points] Use the limit definition of the derivative to write an explicit expression for \( N'(-2) \). Your answer should not involve the letter \( N \). Do not attempt to evaluate or simplify the limit. Please write your final answer in the answer box provided below.

Answer: \( N'(-2) = \)

\[
\]

b. [4 points] Find all values of \( k \) so that \( N(u) \) is continuous at \( u = 1 \). Show your work carefully, and leave your answer(s) in exact form.

Answer: \( k = \)

8. [7 points] Suppose \( w \) and \( q \) are continuous and invertible functions. The table below shows many values of \( w \) and \( q^{-1} \) (the inverse of \( q \)).

<table>
<thead>
<tr>
<th>( s )</th>
<th>-4.7</th>
<th>-3.3</th>
<th>-1.8</th>
<th>0.7</th>
<th>1.1</th>
<th>1.6</th>
<th>2.1</th>
<th>2.5</th>
<th>4.1</th>
<th>5.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>( w(s) )</td>
<td>4.1</td>
<td>2.5</td>
<td>1.4</td>
<td>0</td>
<td>-0.5</td>
<td>-1.8</td>
<td>-2</td>
<td>-3.1</td>
<td>-3.9</td>
<td>-4.7</td>
</tr>
<tr>
<td>( q^{-1}(s) )</td>
<td>-3.7</td>
<td>0.1</td>
<td>0.7</td>
<td>2.5</td>
<td>4.1</td>
<td>5.1</td>
<td>5.2</td>
<td>7.3</td>
<td>9.5</td>
<td>11.3</td>
</tr>
</tbody>
</table>

a. [2 points] Find \( q^{-1}(w(-4.7)) \).

Answer: 

b. [2 points] Find \( w(q(0.7)) \).

Answer: 

c. [3 points] Find the average rate of change of \( q(x) \) between \( x = 0.7 \) and \( x = 5.2 \). Be sure to show your work.

Answer: 
