5. [10 points] The table below gives several values of a function $q(u)$ and its first and second derivatives. Assume that all of $q(u)$, $q'(u)$, and $q''(u)$ are defined and continuous for all real numbers $u$.

<table>
<thead>
<tr>
<th>$u$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>$q(u)$</td>
<td>30</td>
<td>23</td>
<td>19</td>
<td>20</td>
<td>24</td>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>$q'(u)$</td>
<td>0</td>
<td>-6</td>
<td>-2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>-2</td>
</tr>
<tr>
<td>$q''(u)$</td>
<td>-9</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>-5</td>
<td>0</td>
</tr>
</tbody>
</table>

Compute each of the following. Do not give approximations. If it is not possible to find the value exactly, write NOT POSSIBLE.

a. [2 points] Compute $\int_{5}^{2} q''(t) \, dt$.

Solution: $\int_{5}^{2} q''(t) \, dt = q'(2) - q'(5) = -2 - 1 = -3.$

Answer: $\int_{5}^{2} q''(t) \, dt = \boxed{-3}$

b. [2 points] Compute $\int_{1}^{5} (-2q''(u) + 2u) \, du$.

Solution: $\int_{1}^{5} (-2q''(u) + 2u) \, du = (-2q'(5) + 5^2) - (-2q'(1) + 1^2) = (-2 + 25) - (12 + 1) = 10.$

Answer: $\int_{1}^{5} (-2q''(u) + 2u) \, du = \boxed{10}$

c. [2 points] Suppose that $q(u)$ is an even function. Compute $\int_{-5}^{5} q(u) \, du$.

Solution: $\int_{-5}^{5} q(u) \, du = 2 \int_{0}^{5} q(u) \, du$. This cannot be computed exactly.

Answer: $\int_{-5}^{5} q(u) \, du = \boxed{\text{not possible}}$

d. [2 points] Suppose that $q(u)$ is an even function. Compute $\int_{-5}^{5} (q'(u) + 7) \, du$.

Solution: $\int_{-5}^{5} (q'(u) + 7) \, du = (q(5) + 7 \cdot 5) - (q(-5) + 7 \cdot (-5)).$ Since $q(5) = q(-5)$, we have $\int_{-5}^{5} (q'(u) + 7) \, du = q(5) - q(-5) + 7 \cdot 10 = 70.$

Answer: $\int_{-5}^{5} (q'(u) + 7) \, du = \boxed{70}$

e. [2 points] Compute the average value of $-5q'(u)$ on the interval $[1, 4]$.

Solution: Average value = $\frac{1}{4-1} \int_{1}^{4} -5q'(u) \, du = \frac{1}{3} [-5q(4) - (-5q(1))] = \frac{5}{3} [q(1) - q(4)] = \frac{-5}{3}$

Answer: $\boxed{\frac{-5}{3}}$