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.

u	0	1	2	3	4	5	6
$q(u)$	30	23	19	20	24	25	24
$q'(u)$	0	-6	-2	1	3	1	-2
$q''(u)$	-9	5	4	3	2	-5	0

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 $\displaystyle\int_5^2 q''(t)\,dt$.

Solution: $\int_5^2 q''(t)\,dt = q'(2) - q'(5) = -2 - 1 = -3$.

Answer: $\displaystyle\int_5^2 q''(t)\,dt =$ -3

b. [2 points] Compute $\displaystyle\int_1^5 (-2q''(u) + 2u)\,du$.

Solution: $\int_1^5(-2q''(u)+2u)\,du = (-2q'(5)+5^2)-(-2q'(1)+1^2) = (-2+25)-(12+1) = 10$.

Answer: $\displaystyle\int_1^5 (-2q''(u) + 2u)\,du =$ 10

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

Solution: $\int_{-5}^5 q(u)\,du = 2\int_0^5 q(u)\,du$. This cannot be computed exactly.

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

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

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

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

Solution: Average value $= \frac{1}{4-1}\int_1^4 -5q'(u)\,du = \frac{1}{3}\left[-5q(4) - (-5q(1))\right] = \frac{5}{3}\left[q(1) - q(4)\right] = \frac{-5}{3}$.

Answer: $\dfrac{-5}{3}$