

Answer on Question #64597 – Math – Calculus

Question

The expression $I = 6t^3 + 2t^2 + 5t - 2$ shows the relationship between current and time in seconds. How would you find the electric charge passing between

$t = 2s$ and $t = 5s$.

Solution

$$\begin{aligned} Q &= \int_2^5 I(t) dt = \int_2^5 (6t^3 + 2t^2 + 5t - 2) dt = \left(\frac{6t^4}{4} + \frac{2t^3}{3} + \frac{5t^2}{2} - 2t \right) \Big|_2^5 = \\ &= \frac{6}{4}(5^4 - 2^4) + \frac{2}{3}(5^3 - 2^3) + \frac{5}{2}(5^2 - 2^2) - 2(5 - 2) = \\ &= \frac{3}{2}(625 - 16) + \frac{2}{3}(125 - 8) + \frac{5}{2}(25 - 4) - 2 \cdot 3 = \\ &= \frac{3}{2} \cdot 609 + \frac{2}{3} \cdot 117 + \frac{5}{2} \cdot 21 - 6 = \frac{3 \cdot 609 + 5 \cdot 21}{2} + 2 \cdot 39 - 6 = \\ &= \frac{1827 + 105}{2} + 78 - 6 = \frac{1932}{2} + 78 - 6 = 966 + 78 - 6 = 1038. \end{aligned}$$

Answer: 1038.