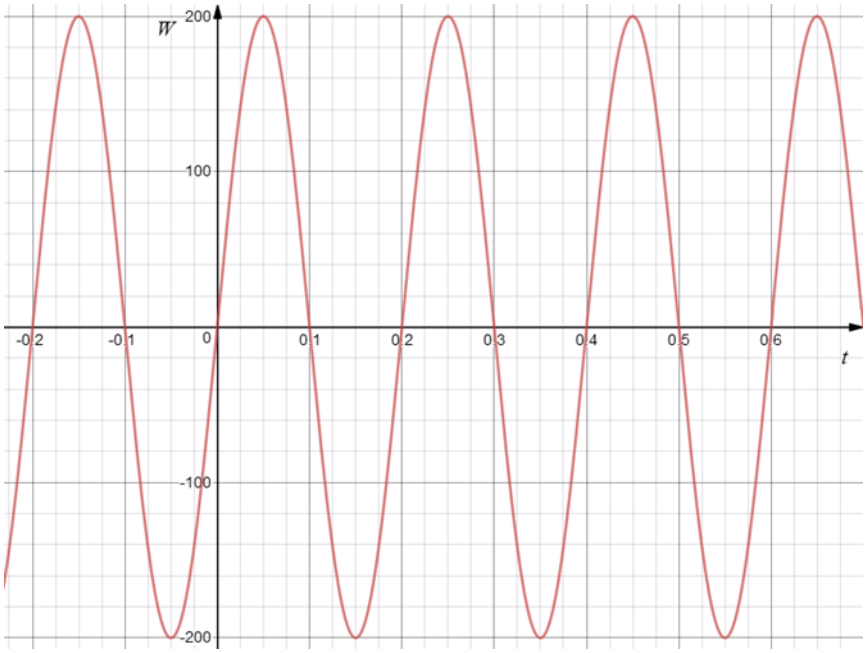
Answer on Question #64505 – Math – Calculus

Question

When there is the equation $W = 200 \cdot \sin(10\pi t)$ find out the work done take into consideration that compression takes place only in the first half cycle. t = 0 to t = 0.1 s.

Solution



$$W_{done} = \int_0^{0.1} 200 \cdot \sin(10\pi t)\, dt = \int_0^{0.1} 200 \cdot \frac{1}{10\pi} sin(10\pi t) d(10\pi t) = 200 \cdot \frac{1}{10\pi} \cdot (-\cos(10\pi t))\,|_0^{0.1}$$

$$= -\frac{200}{10\pi}\left(\cos(10\pi \cdot 0.1) - \cos(10\pi \cdot 0)\right) = -\frac{20}{\pi}(\cos(\pi) - \cos(0)) = -\frac{20}{\pi}(-1 - 1)$$

$$= \frac{40}{\pi}.$$

Answer: $W_{done} = \frac{40}{\pi}$.