Quiz 18

A particle is moved along the x-axis by a force of
$F(x) = x^2 - \sin(5x)$. Newtons How much work is done in moving the
particle from $x = 0$ to $x = \pi/10$?

$$\Delta W = F \cdot \Delta d$$

$$W = \int_a^b F\, dx$$

$$= \int_0^{\pi/10} x^2 - \sin(5x)\, dx$$

$$= \tfrac{1}{3}x^3 + \tfrac{1}{5}\cos(5x)\Big|_0^{\pi/10}$$

$$= \left[\tfrac{1}{3}\left(\tfrac{\pi}{10}\right)^3 + \tfrac{1}{5}\cos\left(5 \cdot \tfrac{\pi}{10}\right)\right] - \left[\tfrac{1}{3} \cdot 0^3 + \tfrac{1}{5}\cos(0)\right]$$

$$= \tfrac{\pi^3}{3000} + \tfrac{1}{5}\cos\left(\tfrac{\pi}{2}\right) - \tfrac{1}{5}$$

$$= \tfrac{\pi^3}{3000} - \tfrac{1}{5}$$

$$= \tfrac{\pi^3 - 600}{3000}$$

$$= -.1896645744 \qquad \text{Joules}$$