$$A = \int_0^{10} 2\sin\frac{\pi}{10}t \cdot \left[2 + \frac{2\pi}{10}\sin\frac{\pi}{10}t \cdot dt\right]$$

$$A = \int_0^{10} 4\sin\frac{\pi}{10}t + \frac{2\pi}{5}\sin^2\frac{\pi}{10}t \cdot dt \cdot$$

Recall that $\sin^2 x = \frac{1}{2}(1 - \cos 2x)$

$$\sin^2\frac{\pi}{10} = \frac{1}{2}\left(1 - \cos\frac{2\pi}{10}\right).$$

$$A = \int_0^{10} 4\sin\frac{\pi}{10}t + \frac{2\pi}{5} \times \frac{1}{2}\left[1 - \cos\frac{2\pi}{10}\right]t$$

$$A = \int_0^{10} 4\sin\frac{\pi}{10}t + \frac{1}{5}\pi\left(1 - \cos\frac{2\pi t}{10}\right) dt.$$

$$A = \int_0^{10} 4\sin\frac{\pi}{10}t + \int_0^{10}\frac{\pi}{5}\left(1 - \cos\frac{\pi}{5}t\right) \cdot dt.$$

$$A = 4\left[\frac{-10}{\pi}\cos\frac{\pi}{10}t\right]_0^{10} + \frac{\pi}{5}\left[t - \frac{5}{\pi}\sin\frac{\pi}{5}t\right]_0^{10}$$

$$A = \left[4\left[\frac{-10}{\pi}\cos\frac{\pi}{10}(10) + \frac{\pi}{5}\left(10 - \frac{5}{\pi}\sin\pi(10)\right)\right] - \left[4\left(\frac{-10}{\pi}\cos\frac{\pi}{10}(0)\right.\right.\right.$$

$$\left.\left.\left. + \frac{\pi}{5}\left(0 - \frac{5}{\pi}\sin\frac{\pi}{5}(0)\right)\right]\right.\right.$$

$$A = [12.73 + 2\pi] - [-12.73 + 0]$$

$$A = 31.743 \text{ sq. units.}$$

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18/ENG01/016.

1.) $y_2 = 3e^{2x}$, $y_1 = 3e^{-x}$

$x = 1$ and $x = 2$.

$$\int_a^b y_2 \cdot dx - \int_a^b y_1 \cdot dx.$$

$$\left[\int_1^2 3e^{2x} - \int_1^2 3e^{-x}\right] dx.$$

$$\left[\left[\left|\frac{3e^{2x}}{2}\right|_1^2\right] - \left[\frac{3e^{-x}}{-}\right]_1^2\right]$$

$$\left[\frac{3e^{2(2)}}{2} - \frac{3e^{-(2)}}{-1}\right] - \left[\frac{3e^{2(1)}}{2} - \frac{3e^{-(1)}}{-1}\right]$$

$$= \left[\frac{3e^{2(2)}}{2} + \frac{3e^{-(2)}}{1}\right] - \left[\frac{3e^{2(1)}}{2} + \frac{3e^{-(1)}}{1}\right]$$

$$= 82.80 - 12.18$$

$$= 70.12 \text{ sq. units.}$$

2.) $y = 2\sin\frac{\pi}{10}t$ $\quad x = 2 + 2t - 2\cos\frac{\pi}{10}t.$

$$A = \int_a^b y \cdot dx.$$

$$A = \int_0^{10} y \cdot dx.$$

$$A = \int_0^{10} 2\sin\frac{\pi}{10}t \cdot dx.$$

$$x = 2 + 2t - 2\cos\frac{\pi}{10}t.$$

$$\frac{dx}{dt} = 2 + \frac{2\pi}{10}\sin\frac{\pi}{10}t$$

$$dx = 2 + \frac{2\pi}{10}\sin\frac{\pi}{10}t \cdot dt.$$