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

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

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

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

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

$$A = \left[12.73 + 2\pi\right] - \left(-12.73 + 0.\cancel{6}283\right)$$

$A = 31.74339$ units.

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

$$\int_a^b y_2\,dx - \int_a^b y_1\,dx$$

$$\int_1^2 3e^{2x} - \int_1^2 3e^{-x}\,dx$$

$$\left[\left[\frac{3e^{2x}}{2}\right]_1^2 - \left[\frac{3e^{-x}}{-1}\right]_1^2\right]$$

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

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

$$= 82.30 - 12.18$$

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

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

$$A = \int_a^b y\,dx \qquad \frac{dx}{dt} = 2 + \frac{2\pi}{10}\sin\frac{\pi}{10}t$$

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

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

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

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

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