U20-MWOSU ADAEZE.

MECHATRONICS
18IEM405106S

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

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

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

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

$\left[\frac{3}{2} \times 47.21\right] - (-3 \times -0.232]$

$70.815 - 0.698$

$70.117$ sq unit

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

$$\frac{dx}{dt} = 2 + \frac{2\pi}{10}\sin\frac{\pi}{10}t = 2 + \frac{\pi}{5}\sin\frac{\pi}{10}t$$

$$\int_a^b y\,dx$$

$$\int_0^{10} \left(2\sin\frac{\pi}{10}t\right)\left(2 + \frac{\pi}{5}\sin\frac{\pi}{10}t\right)dt$$

$$\int_0^{10} \left(4\sin\frac{\pi}{10}t + \frac{2\pi}{5}\sin\frac{\pi}{10}t\right)dt$$

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

$$\int_0^{10} 4\sin\frac{\pi}{10}t + \frac{\pi}{5}\left\{-\frac{\pi}{5}\cos\frac{2\pi}{10}\right.\pi\,dt$$

$$\left[-\frac{40}{\pi}\cos\frac{\pi}{10}t + \frac{\pi}{5}t - \frac{\pi}{5}\times\frac{5}{\pi}\sin\frac{\pi}{5}\right]_0^{10}$$

$$\left(-\frac{40}{\pi}\cos\pi + \frac{\pi}{5}(10) - \sin\frac{\pi}{5}(10)\right) - \left(-\frac{40}{\pi}\cos 0 - \sin 0 - 0\right)$$

$$\frac{40}{\pi} + 2\pi + \frac{40}{\pi}$$

$$2\pi + \frac{80}{\pi} = 31.75 \text{ sq units}$$