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

$$\text{Area} = \int_a^b y_1 dx - \int_a^b y_2 dx \\ \therefore y_1 = 3e^{2x}$$

$$\int_a^b y_1 dx = \int_1^2 3e^{2x} = \left[ \frac{3e^{2x}}{2} \right]_1^2 = \left[ \frac{3e^{4x}}{2} \right] - \left[ \frac{3e^{2x}}{2} \right]$$

$$= \frac{3e^4}{2} - \frac{3e^2}{2} = 70.81 \text{ Square units}$$

$$\text{For } y_2 \\ \int_1^2 3e^{-x} = \left[ \frac{3e^{-x}}{-1} \right]_1^2 = \left[ -3e^{-x} \right]$$

$$\Rightarrow \left[ -3e^{-x} \right]_1^2 = \left[ -3e^{-x} \right]_1^2 \Rightarrow -3e^{-2} - (-3e^{-1}) \\ = 0.698 \text{ Square units}$$

Therefore Area bounded in the curve

$$= 70.81 - 0.69 = 70.11 \text{ Squares}$$

$$2. \quad y = 2 \sin \frac{\pi}{10} t$$

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

$$\text{Area} = \int_a^b y dx \quad b=10 \quad a=0$$

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

$$\therefore A = \int_0^{10} 2 \sin \frac{\pi}{10} + \left[ 2 + \frac{\pi}{5} \sin \frac{\pi}{10} t \right] \\ = \int_0^{10} \left[ 4 \sin \frac{\pi}{10} t + \frac{2\pi \sin^2 \left( \frac{\pi t}{10} \right)}{5} \right]$$

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

$$10 \int_0^{10} \left[ \frac{-40 \cos(\pi t/10)}{\pi} + \frac{\pi t - 5 \sin(\pi t/5)}{5} \right]$$

$$10 \left[ \frac{40 \cos(\pi t/10)}{\pi} + \pi t - \frac{5 \sin(\pi t/5)}{5} \right] = \cancel{10 \left[ \frac{40 \cos(\pi t/10)}{\pi} + \pi t - \frac{5 \sin(\pi t/5)}{5} \right]}$$

$$- \left[ \frac{-40 \cos(\pi t/10)}{\pi} + \frac{\pi t - 5 \sin(\pi t/5)}{5} \right]$$

$$\Rightarrow \left[ \frac{-40 \cos(\pi \cdot 10/10)}{\pi} + \frac{\pi(10) - 5 \sin(\pi \cdot 10/5)}{5} \right] - \left[ \frac{-40 \cos(\pi \cdot 0/10)}{\pi} + \frac{\pi(0) - 5 \sin(\pi \cdot 0/5)}{5} \right]$$

$$- \left[ \frac{\pi(0) - 5 \sin(\pi/5)}{5} \right]$$

$$= \left[ \frac{40 + 2\pi}{\pi} \right] - \left[ \frac{-40 + 0}{\pi} \right]$$

$$\frac{40}{\pi} + \frac{2\pi}{\pi} + \frac{40}{\pi} = \frac{80}{\pi} + 2\pi = 31.74 \text{ square units}$$