Name: Nyeche kingsley
Dept: Mechanical
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1) $y = 3e^{2x}$, $y = 3e^{-x}$
ordinate at $x = 1$ and $x = 2$

$$\text{Area} = \int_a^b y_a\,dx - \int_a^b y_b\,dx$$

$$y_a = 3e^{2x}$$

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

$= 70.81$ Square units

$$y_b = 3e^{-x}$$

$$\int_1^2 3e^{-x} = \left[\frac{3e^{-x}}{-1}\right]_1^2 = -3e^{-2} - (-3e^{-1})$$

$= 0.698$ Square units

∴ Area bounded by the curves
$= 70.81 - 0.698 = 70.116$ Square units

2) $y = 2\sin\frac{\pi}{10}t$
$x = 2 + 2t - 2\cos\frac{\pi}{10}t$
$t = 0$ and $t = 10$

$$\text{Area} = \int_b^a y\,dx$$

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

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

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

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

$$= \Big|_0^{10} \frac{-40\cos\left(\frac{\pi t}{10}\right)}{\pi} + \frac{2\pi}{5} \times \pi t - 5\sin\left(\frac{\pi t}{5}\right)$$

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

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

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

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

$$= \frac{80}{\pi} + 2\pi$$

= 31.74 square units.