OLEBADE RAPHAEL OLUWAFEMI

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ELEC/ELEC

MATRIC NO

① $y = 3e^{2x}$

$y = 3e^{-x}$

$x = 1, \quad x = 2$

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

$y_a = 3e^{2x}$

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

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

$y_b = 3e^{-x}$

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

$= -3e^{-2} - (-3e^{-1})$

$\Rightarrow 0.698 \text{ square units}$

$\therefore$ Area bounded by the curves

$= 70.81 - 0.698 = 70.112 \text{ square units}$

② $y = 2\sin \pi/10 t$

$x = 2 + 2t - 2\cos \pi/10 t$

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

$dx = 2 + \pi/5 \sin \pi/10 t \, dt$

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

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

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

$\Rightarrow 10\left[\frac{-40\cos(\pi t/10)}{\pi} + \frac{2\pi}{5} \times \frac{\pi t - \sin\left(\frac{\pi t}{5}\right)}{2\pi}\right]$

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

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

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

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

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

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

$= 31.74 \text{ square units.}$