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DEPT: CIVIL ENGINEERI

COURSE: ENG 281

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QUESTION I

Find the area bounded

and the ordinates at

Solution

$A = \int_1^2 y_2 \cdot dx - \int_1^2 y_1 \cdot$

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

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

$= 3\int_1^2 e^{2x} - 3\int e^{-x}$

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

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

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

$= 3(23.605) - 3$

$= 70.12$ squa

QUESTION II

The parametric equatio

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

between $t = 0$ and $t =$

Solution

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

$A = \int_{t_1}^{t_2} y \cdot dx$

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

$A = \int_0^{10} 2\sin\pi/_{10}\,t \cdot \left(2 + \frac{2\pi}{1}\right.$

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

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

Recall: $\sin^2 a = \frac{1}{2}(1 - \cos$

$\therefore \sin^2 \pi/_{10}t = \frac{1}{2}(1 - c$

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

$= 4\left[-\frac{10}{\pi}\cos\frac{\pi}{10}t\right]_0^{10} + \frac{2}{10}\pi$

$= 4\left[-\frac{10}{\pi}\cos\frac{\pi}{10}(10) - \left(-\frac{10}{\pi}\cos\right.\right.$

$= 4\left[-\frac{10}{\pi}\cos\pi + \frac{10}{\pi}\right]$

$= -\frac{40}{\pi}\cos\pi + \frac{40}{\pi} +$

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

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

$= 31.75$ square