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1 $y = 3e^{2x}$ and $y = 3e^{-x}$ at the point $x = 1$ and $x = 2$ find the area founded by curves

Sol$\bar{n}$

Area between two curves

$$A \int_a^b f(x) - g(x)\, dx$$

Where $f(x) = 3e^{2x}$ and $g(x) = 3e^{-x}$

$a = 1$, $b = 2$

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

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

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

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

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

$$A = 3[(27.2 + 0.135) - 4.06]$$

$$A = 3.(23.275)$$

$$A = 69.823 \text{ units}$$

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

Sol$\bar{n}$

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

$$A = \int_0^{10} 2\sin\pi/10 + dx$$

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

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

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

$$A = \int_0^{10} +2\sin\frac{\pi}{10} + \frac{\pi}{5}\sin\frac{\pi}{10} + dt$$

$$A = 2\int_0^{10} 2\sin\frac{\pi}{10} + \frac{\pi}{5}\sin\frac{\pi}{10} + dt$$

$$A = 2\left[\frac{-20}{\pi}\cos\left(\frac{\pi}{10}t\right) - 2\cos\frac{\pi}{10}t\right]_0^{10}$$

$$A = \left[\frac{-40}{\pi}(0)\left(\frac{\pi}{10}t\right) - 4\cos\frac{\pi}{10}t\right]_0^{10}$$

$$A = \left[\left(-40\cos\left[\frac{\pi}{10}\times 10\right] - 4\cos\frac{\pi}{10}\times 10\right) - \frac{40}{\pi}\cos\left(\frac{\pi}{10}\times 4\cos\frac{\pi}{10}\times 0\right)\right]$$

$$A = -8.73 - 8.73$$

$$A = -17.46 \text{ unit}^2$$