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#121260

Assessment 8.1

MATH-1360-80
Prof. Milena Gomez

Resuelva:

Calcular el área de la superficie generada al girar alrededor del eje "x" la curva descrita por: $x = e^t,\ y = 2e^t + 1 \quad 0 \le t \le 1$.

$$S = 2\sqrt{5}\,(e^2 + e - 2)\,\pi$$

$$\frac{dx}{dt} = e^t \qquad \frac{dy}{dt} = 2e^t$$

$$\therefore \frac{dy}{dx} = \frac{dy}{dt} \cdot \frac{dt}{dx} = \frac{2e^t}{2e^t} = 2$$

$$S = \int_a^b 2\pi y \sqrt{1 + \left(\frac{dy}{dx}\right)^2}\, dx$$

$$= \int_a^b 2\pi (2e^t + 1)\sqrt{1 + (2)^2} \cdot e^t\, dt$$

$$= \int_0^1 2\pi (2e^t + 1)\sqrt{5}\, e^t\, dt$$

$$= 2\sqrt{5}\,\pi \int_0^1 (2e^{2t} + e^t)\, dt$$

$$= 2\sqrt{5}\,\pi \left(\frac{2e^{2t}}{2} + e^t\right) dt$$

$$= 2\sqrt{5}\,\pi \left[\frac{2e^{2t}}{2} + e^t\right]_0^1$$

$$= 2\sqrt{5}\,\pi\,(e^2 + e - 2)$$

$$= 2\sqrt{5}\,(e^2 + e - 2)\,\pi$$