NAME: Abdon Morales Exam 1 Question 1 427J

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1. Compute the unique solution to the I.V.P.

$$\frac{dy}{dt} = \frac{\sqrt{1-y^2}}{t}, \quad y(e^4) = 0.$$

NOTE: Use separable equations and leave your solution implicit.

$$\frac{dy}{dt} = \frac{\sqrt{1-y^2}}{t} dt$$

$$\frac{dy}{\sqrt{1-y^2}} = \frac{\sqrt{1-y^2}}{t} dt$$

$$\frac{1}{\sqrt{1-y^2}} = \frac{1}{2} dt$$

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$$\frac{dt}{dt} = \frac{\sqrt{1-y^2}}{t} dt \qquad \text{when } y(e^4) = 0$$

$$\frac{dy}{dt} = \frac{\sqrt{1-y^2}}{t} dt \qquad \text{arcsin}(0) = \ln(e^4) + C$$

$$\frac{dy}{\sqrt{1-y^2}} = \frac{\sqrt{1-y^2}}{t} dt \qquad 0 = 4 + C$$

$$\frac{dy}{\sqrt{1-y^2}} = \frac{1}{t} dt \qquad \text{arcsin}(y) = \ln(t) - 4$$