

Quiz #1
Math 3430 - Section 002

Instructions. Be sure to show your work and explain your reasoning for full credit.

NAME Solutions

1. Find the general solution to the differential equation

$$\frac{dy}{dt} = \frac{\cos(t)}{\cos(y)}$$

Separable!

$$\Rightarrow \int \cos y \, dy = \int \cos t \, dt + C$$

$$\Rightarrow \sin y = \sin t + C$$

$$\Rightarrow y = \arcsin(\sin t + C)$$

2. Find the solution to the initial-value problem

$$\frac{dy}{dt} + \frac{y}{t^2} = e^{1/t}, \quad y(1) = 1.$$

Non-homogeneous
FOLODF!

$$\begin{aligned} \mu(t) &= e^{\int \frac{1}{t^2} dt} = e^{-1/t}, \quad \mu(1) = \frac{1}{e} \\ y(t) &= e^{1/t} \left[\int_1^t e^{-1/\tilde{t}} e^{1/\tilde{t}} d\tilde{t} + \mu(1)y(1) \right] \\ &= e^{1/t} \left[\tilde{t} \Big|_1^t + \frac{1}{e} \right] = e^{1/t} \left(t + \frac{1}{e} - 1 \right) \end{aligned}$$