MATH 2700 - DIFFERENTIAL EQUATIONS, Spring 2008, *Kazancı*

QUIZ 4 2/07/08

Name : Solutions

Solve the following initial value problem.

$$\frac{dy}{dt} + \sin(t)\, y = \sin(t) \qquad y(\pi/2) = 0$$

$$\left(\underbrace{e^{-\cos t}}_{\mu}\right)' = \sin t\, e^{-\cos t} \leftarrow \text{found the integrating factor } \mu$$

$$e^{-\cos t}\frac{dy}{dt} + \sin t\, e^{-\cos t}\, y = \sin t \cdot e^{-\cos t}$$

$$\left(y\, e^{-\cos t}\right)' = \sin t\, e^{-\cos t}$$

$$y(t)\, e^{-\cos t} = \int \sin t\, e^{-\cos t}\, dt$$

$$= e^{-\cos t} + C$$

Multiply both sides with $y(t) = \ast e^{\cos t}$:

$$y(t) = 1 + C e^{\cos t}$$

$$y(\pi/2) = 1 + C\underbrace{e^{\cos(\pi/2)}}_{1} = 1 + C = 0 \Rightarrow \underline{C = -1}$$

$$\boxed{y(t) = 1 - e^{\cos t}}$$