2007 **10.** **(a)** Solve the differential equation

$$\frac{dy}{dx} = y^2 \sin x$$

given that $y = 1$ when $x = \frac{\pi}{2}$.

$$\frac{dy}{dx} = y^2 \sin x$$

$$\int \frac{dy}{y^2} = \int \sin x \, dx \qquad 5$$

$$-\frac{1}{y} = -\cos x + C \qquad 5$$

$$y = 1,\ x = \frac{\pi}{2} \Rightarrow C = -1 \qquad 5$$

$$\frac{1}{y} = \cos x + 1$$

$$y = \frac{1}{1 + \cos x} \qquad 5$$

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