Name: Solution Date: 4/11/2024

M20580 L.A. and D.E. Tutorial
Quiz 9

1. Which of the following functions is the solution of the equation $y' = ty$ with $y(0) = 1$?

   (a) t
   (b) $e^{\cos t}$
   (c) $\frac{t^2}{2}$
   (d) e^t
   (e) $e^{\frac{t^2}{2}}$

$$\frac{dy}{dt} = ty$$
$$\frac{1}{y}dy = t\,dt$$
$$\int \frac{1}{y}\,dy = \int t\,dt$$
$$\ln y = \frac{1}{2}t^2 + C$$
$$y = e^{\frac{1}{2}t^2 + C}$$
$$y(0) = 1 \quad \Rightarrow \quad C = 0$$

2. Solve the given differential equation by separation of variables.

$$\frac{dy}{dx} = \sin(5x)$$

$$dy = \sin(5x)\,dx$$
$$\int dy = \int \sin(5x)\,dx$$
$$y = \frac{-\cos(5x)}{5} + C$$