Solve each differential equation given the initial condition and state the interval for which it is valid.

1. $\frac{dy}{dx} = 3\sin x$ and $y = 2$ when $x = 0$

2. $\frac{dy}{dx} = -\frac{1}{x^2} - \frac{3}{x^4} + 12$ and $y = 3$ when $x = 1$

3. $\frac{dy}{dt} = 2e^t - \cos t$ and $y = 3$ when $t = 0$

4. $\frac{dv}{dt} = 4\sec t \tan t + e^t + 6t$ and $v = 5$ when $t = 0$

5. $\frac{du}{dx} = 5\sec^2 x - \frac{3\sqrt{x}}{2}$ and $u = 7$ when $x = 0$

6. $\frac{dy}{dt} = (\cos t)e^{\sin t}$ and $y = 2$ when $t = 0$

7. $\frac{dy}{dx} = \frac{1}{x-2} + e^{x-2}$ and $y = 1$ when $x = 3$

8. $\frac{dy}{dx} = 3x^2 - \frac{2x}{\sqrt{1-x^4}}$ and $y = \frac{1}{\sqrt[4]{8}}$ when $x = \frac{1}{\sqrt[4]{2}}$