

$$y' = \sin x, \quad y(0) = 2$$

Integrate:

$$y = \int \sin x \, dx = -\cos x + C$$

Apply initial value:

$$y(0) = -\cos(0) + C = 2$$

$$-1 + C = 2$$

$$C = 3$$

so, $y = -\cos x + 3$