Answer on Question #69656 – Math – Differential Equations

Question

Solve the initial value problem

$$\frac{dy}{dx} = 12x^3 - 2\sin x\,, y(0) = 3$$

Solution

This is a separable equation.
Separate the variables

$$dy = (12x^3 - 2\sin x)dx$$

Integrate both sides

$$\int dy = \int (12x^3 - 2\sin x)\,dx$$

$$y = 12\int x^3\,dx - 2\int \sin x\,dx$$

$$y = 12\frac{x^4}{4} + 2\cos x + C$$

$$y = 3x^4 + 2\cos x + C$$

We have that $y(0) = 3$. Then

$$y(0) = 3(0) + 2\cos(0) + C = 3$$

$$C = 1$$

$$y = 3x^4 + 2\cos x + 1$$

Answer: $y = 3x^4 + 2\cos x + 1$.