Answer on Question #69663 – Math – Differential Equations

Question

Solve the initial value problem

$$\frac{dy}{dx} = 12x^3 - 2\sin x, \qquad \textbf{(1)}$$
$$y(0) = 3. \qquad\qquad \textbf{(2)}$$

Solution

We can rewrite the equation (1) in the following form:

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

Now we shall integrate both sides of the previous equation:

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

$$y = y(x) = 3x^4 + 2\cos x + C. \quad \textbf{(3)}$$

To find a constant C, we shall apply the initial condition (2) to the formula (3):

$$y(0) = 2 + C = 3,$$

$$C = 1.$$

Answer:

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