

Provide a clear and organized presentation. Show all of your work and completely simplify your answer. Solve the following differential equation:

$$(2y^3 + 11y^2 + 26y + 24)\sqrt{3 - x^2} \frac{dy}{dx} = x^2(y^4 + 7y^3 + 18y^2 + 27y + 27)$$