Question: Consider the IVP
\[(x^2 + 9)y''' + (\sin x)y' - 4y = 0, \quad y(1) = y'(1) = y''(1) = 0.\]

a) Show that the IVP has a unique solution on \((-\infty, \infty)\).
b) Find this unique solution.

Answer: a) The functions \((x^2 + 9), \sin x, -4\) are continuous and \(x^2 + 9 \neq 0\) \(\forall x \in \mathbb{R}\), and the initial point \(x_0 = 1 \in \mathbb{R}\) \(\therefore\) the IVP has a unique soln. on \((-\infty, \infty)\).
b) \(y = 0\).