QUIZ 5

Solve the following initial value problem

$$y'' + 4y = \delta(t-3), \quad y(0) = 1, \quad y'(0) = 0.$$

Solutions: Applying Laplace transform to the question and set $Y(s) = \mathfrak{L}(y)$, we get

$$s^2Y(s) - s + 4Y(s) = \mathfrak{L}(\delta(t-3)) = e^{-3s}.$$

So we get

$$Y(s) = \frac{s}{s^2+4} + \frac{e^{-3s}}{s^2+4}.$$

Now apply Laplace inverse, we get

$$y(t) = \cos(2t) + u_3(t)\frac{1}{2}\sin(2(t-3)).$$