MAP 2302 Additional Problems 3

For 1 – 3, use the Laplace transform to solve the given initial-value problem:

1. $y' - 3y = \delta(t-2),\ y(0) = 0$

2. $y'' + y = \delta\left(t - \frac{1}{2}\pi\right) + \delta\left(t - \frac{3}{2}\pi\right),\ y(0) = 0, y'(0) = 0$

3. $y'' + 4y' + 5y = \delta(t - 2\pi), y(0) = 0, y'(0) = 0$

Answers:

1. $y = e^{3(t-2)}U(t-2)$

2. $y = -\cos t\, U\left(t - \frac{\pi}{2}\right) + \cos t\, U\left(t - \frac{3\pi}{2}\right)$

3. $y = e^{-2(t-2\pi)} \sin t\, U(t - 2\pi)$