

1. (6 points) Solve $y'' + 6y' + 8y = \ln(0.5(t + e))\delta(t - e)$ if $y(0) = 1 = y'(0)$.

2. (4 points) Write the solution to $y''(t) + 16y(t) = \sin(2t)$ if $y(0) = 0 = y'(0)$ in $f(t) * g(t)$ form and then compute the convolution.

3. (6 points) Solve $y'(t) = t^2 + \int_0^t \cos(t - \tau)y(\tau) d\tau$ for $y(t)$ using Laplace transforms if $y(0) = 1$.

4. (4 points) Find the Laplace transform for $t^2H(t - 3)$. Be sure to show work.