

1. (7 points) Solve $y''(t) + 4y(t) = tH(t - 2) + 2t\delta(t - 1)$ if $y(0) = 0$ and $y'(0) = 0$.

2. (6 points) Solve $f(t) = t - \int_0^t (t - \tau)f(\tau)d\tau$.

3. (6 points) Use the definition of Laplace transform to find $\mathcal{L}\{t^2\}$.

4. (6 points) Find the Laplace transform of $f(t) = (t^2 - 4t + 2)\delta(t - 1) + \cos(t)H(t - \pi)$. Show work.