

1. Compute the following.

(a) $\mathcal{L}\{f(t)\}$ where $f(t) = \begin{cases} 0 & \text{if } t < 2 \\ t^2 & \text{if } 2 \leq t \end{cases}$

(b) $\mathcal{L}^{-1}\left\{\frac{1-e^{-3s}}{s^2+3s+10}\right\}$

(c) [7.2.19] Compute the inverse of $\begin{pmatrix} 1 & -1 & 2 & 0 \\ -1 & 2 & -4 & 2 \\ 1 & 0 & 1 & 3 \\ -2 & 2 & 0 & -1 \end{pmatrix}$.

2. [6.4.13] Solve $y^{(4)} + 5y'' + 4y = 1 - u_\pi(t)$ with $y(0) = y'(0) = y''(0) = y^{(3)}(0) = 0$.