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) $\mathcal{L}\{g(t)\}$ where $g(t) = \begin{cases} 3 & \text{if } t < \pi \\ \cos t & \text{if } t \geq \pi \end{cases}$.

   (c) $\mathcal{L}^{-1}\left\{\frac{1-e^{-3s}}{s^2+6s+10}\right\}$

   (d) $\mathcal{L}^{-1}\left\{\frac{s+3}{(s^2+1)(s^2+6s+10)}\right\}$

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