Homework #9 **Math 527, UNH spring 2015**
Due Tuesday, April 7 in recitation.

Problems 1,2: Express the function $f(t)$ in terms of the Heaviside function $\mathscr{U}(t-a)$ and then find the Laplace transform $\mathscr{L}\{f(t)\}$.

1. $f(t) = \begin{cases} 0, & 0 \le t < 3\pi/2 \\ \sin t, & 3\pi/2 \le t \end{cases}$

2. $f(t) = \begin{cases} 1, & 0 \le t < 4 \\ 0, & 4 \le t < 6 \\ 3, & 6 \le t \end{cases}$

Problems 3-6: Use Laplace transforms to solve the initial-value problems.

3. $y' + y = f(t), \quad y(0) = 0, \quad$ where $f(t) = \begin{cases} 1, & 0 \le t < 3 \\ -1, & 3 \le t \end{cases}$

4. $y'' + 4y = \sin t\, \mathscr{U}(t - 2\pi), \quad y(0) = 1, \quad y'(0) = 0$

5. $y'' - 5y' + 6y = \mathscr{U}(t-1), \quad y(0) = 0, \quad y'(0) = 1$

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