

## HOMEWORK 12

DUE: MONDAY, JUNE 26

1. For each of the following piecewise functions:

- Compute the Laplace transform **using the basic definition** (without the table).
- Draw the graph.
- Rewrite the function in terms of Heaviside functions.
- Compute the Laplace transform, but this time using the table.

$$(1) f(t) = \begin{cases} 1, & 0 \leq t \leq \pi \\ 0, & \pi < t \end{cases}$$

$$(2) f(t) = \begin{cases} t, & 0 \leq t \leq 1 \\ 0, & 1 < t \end{cases}$$

$$(3) f(t) = \begin{cases} t, & 0 \leq t \leq 1 \\ 1, & 1 < t \end{cases}$$

$$(4) f(t) = \begin{cases} 1, & 0 \leq t \leq 2 \\ e^{-(t-2)}, & 2 < t \end{cases}$$

$$(5) f(t) = \begin{cases} 0, & 0 \leq t \leq \pi \\ t - \pi, & \pi < t \leq 2\pi \\ 0, & 2\pi < t \end{cases}$$

$$(6) f(t) = \begin{cases} t, & 0 \leq t \leq 2 \\ 2 - t, & 2 < t \end{cases}$$

2. Find the inverse Laplace transform of the following functions:

$$(1) (s - 2)^{-4}$$

$$(2) \frac{1 - 2s}{s^2 + 4s + 5}$$

$$(3) \frac{8s^2 - 4s + 12}{s(s^2 + 4)}$$

$$(4) \frac{2(s - 1)e^{-2s}}{s^2 - 2s + 2}$$

$$(5) \frac{e^{-s} + e^{-2s} - e^{-3s} - e^{-4s}}{s}$$

$$(6) \frac{e^2 e^{-4s}}{2s - 1}$$