MATH 231: Differential Equations with Linear Algebra

Hand-Checked Assignment #6, due date: Tues., Apr. 27, 2021

Write up, carefully and legibly, your solutions to the following problems. While you do not need to present one problem per page, please do not put problems side-by-side (i.e., no two-column format). To submit your work it must be

- scanned (all pages) to a single .pdf file (one multi-page file containing all graded problems).
- submitted to `https://www.gradescope.com` as **hc06**.

★40 Graph the function and find its Laplace transform.

(a) $f(t) = t - H(t-1)(t-1)$

(b) $f(t) = H\left(t - \frac{\pi}{4}\right)\cos\left(t - \frac{\pi}{4}\right)$

(c) $f(t) = \begin{cases} 0, & t < 3 \\ t^2 + 3t - 8, & t \geq 3 \end{cases}$

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

(e) $f(t) = e^{3t}\sin(4t)$

(f) $f(t) = 4e^{-2(t-5)}H(t-5)(t-5)^2$

★41 Find the inverse Laplace transform for each function.

(a) $F(s) = \dfrac{2(s-1)}{s^2 - 2s + 2}$

(b) $F(s) = \dfrac{2(s-1)e^{-2s}}{s^2 - 2s + 2}$

(c) $F(s) = \dfrac{4}{s^2 - 4}$

(d) $F(s) = \dfrac{4}{(s-2)^4} + \dfrac{e^{-2s}}{s^2 + s - 2}$

(e) $F(s) = \dfrac{e^{-s} + e^{-2s} - e^{-3s} - e^{-4s}}{s}$

(f) $F(s) = \dfrac{s-2}{s^2 - 4s + 3}$