MATH 316 — REVIEW for Exam 3

1. Laplace Transforms

Topics
- Compute Laplace Transform using the definition, and using the table. In the exam, you will be given the table posted on the course website.
- Be comfortable solving ODEs with Laplace Transforms, including step functions, delta functions and convolutions.
- Graph step functions, compute convolution using definition, understand convergence issues of improper integrals.

Examples, in addition to homework: §6.1: 3
§6.2: 12, 22
§6.4: 9 - solve it using two alternate methods.
§6.5: 1,6
§6.6: 4,8,13,17

2. 2x2 linear systems $x' = Ax$

Topics
- Rewriting 2nd order linear equations as 2x2 linear system
- The eigenvalue problem
- Find the general solution if
  - A has real distinct eigenvalues
  - A has complex eigenvalues
  - A has repeated eigenvalues
- Plot Phase Portraits in all cases
- Find behaviour of components $x(t), y(t)$ for a given trajectory $x(t)$
- Solve initial value problems

Examples, in addition to homework:
§7.1: 5
§7.5: 1,6,7,16
§7.6: 1,2,3,10
§7.8: 1,8