Exam 3 Outline

The exam will cover material in sections 3.6, 3.7 and 7.1-7.6. You may use books and notes, but not a calculator. To earn significant credit for a problem, you must make substantial progress toward a solution, and provide appropriate work or explanation. The topics by section are:

**3.6** Forced, undamped oscillations. Resonance.

**3.7** Simple electrical circuits. The RLC circuit. The transient and steady periodic currents.

**7.1** The Laplace and inverse Laplace transforms. The Laplace transforms of polynomial and exponential functions. The gamma function and the Laplace transform of $t^a$ for $a > -1$. The Laplace transforms of $\cos kt$, $\sin kt$, $\cosh kt$ and $\sinh kt$.

**7.2** The Laplace transforms of $tf(t)$, $f'(t)$ and $f''(t)$. Application of the Laplace transform to IVPs. Inversion of the Laplace transform by partial fraction decomposition. The Laplace transform of $\int_0^t f(z) \, dz$.

**7.3** The Laplace transform of $e^{at}f(t)$. Application to IVPs.

**7.4** Convolutions. The Laplace transforms of $(f * g)(t)$ and $t^n f(t)$. The Laplace transform of $f(t)/t$.

**7.5** Second-order, linear, constant-coefficient ODEs with piecewise continuous nonhomogeneous terms.

**7.6** Impulse and the Dirac delta function $\delta(t)$. The Laplace transform of the delta function. Applications to ODEs.