Topics to Know for Midterm Exam

Definitions/Examples/Demonstrations:
- Differential Equation (ODE, PDE)
- Order
- Linear/Nonlinear
- Solution(explicit, trivial, implicit, particular, singular, general)
- Initial Value Problem, Initial Condition(s)
- Separable Equation
- Exact Differential and Equation
- Variation of parameters
- Integrating factor
- Homogeneous function and equation
- Bernoulli’s equation
- Boundary Value Problem & Boundary Conditions
- Homogeneous/non-homogeneous equation
- Differential operator
- Linear operator
- Linearly dependent/independent
- Wronskian
- Fundamental set
- Complementary solution
- Reduction of order
- Characteristic equation
- Undetermined coefficients
- Equidimensional equation

Statements:
- Existence of a Unique Solution (Th 1.2.1 and Th 4.1.1)
- Criterion for exact differential (Th 2.4.1)
- Superposition Principle – Homogeneous (Th 4.1.2) & Nonhomogeneous (Th 4.1.7)
- Criterion for Linearly Independent Solutions (Th 4.1.3)
- General Solution -- Homogeneous (Th 4.1.5) & Nonhomogeneous (Th 4.1.6)

Proofs/Derivations:
- Superposition Principle – Homogeneous (Th 4.1.2) & Nonhomogeneous (Th 4.1.7)
- General Solution -- Homogeneous (Th 4.1.5) & Nonhomogeneous (Th 4.1.6)
- Substitutions for equidimensional equation