

Midterm1 Review Topics

- (A) Definitions (equilibrium, autonomous, linear, stable, ...)
- (B) Visualizations (slope field, solution curves, phase line)
- (C) Euler's Method
- (D) Modeling with ODEs (formulation and interpretation)
- (E) Exponential growth/decay
- (F) Separation of Variables
- (G) Linear First-Order
- (H) Existence and Uniqueness
- (I) Substitution Techniques and Exact ODEs

Midterm2 Review Topics

(A) Linear ODEs

- (A) General properties of linear ODEs, especially homogeneous
- (B) How to use the characteristic polynomial to solve constant coefficient homogeneous linear ODEs

Distinct real roots

Complex roots

Repeated roots

- (C) How to use undetermined coefficients to solve constant coefficient non-homogeneous linear ODEs
- (D) Application to mass-on-a-spring problems

(B) Systems of ODEs

- (A) General properties of systems of ODEs
- (B) General properties of systems of linear ODEs, especially homogeneous
- (C) Eigenvalue technique for real and complex eigenvalues
- (D) Phase plane for systems (where is each function inc/dec? role of eigenvectors?)

Post-Midterm2 Review Topics

Systems of ODEs:

- (A) Eigenvalue technique for defective eigenvalues
- (B) Converting higher-order ODE's/systems to first-order systems
- (C) Non-homogeneous linear systems (method of undetermined coefficients)
- (D) Classifying equilibria of linear systems
- (E) Classifying equilibria of non-linear systems