Topics for Exam 2

1. **Vector Fields in the Plane**

    1.1 Two–dimensional vector fields.

    1.2 The flow of a vector field.

    1.3 Phase–portrait of a two–dimensional system.

2. **An Application: Law of Conservation of Momentum**

    2.1 Velocity, acceleration and momentum.

    2.2 Second order equations.

3. **Linear Vector Fields**

    3.1 Linear functions.

    3.2 Matrices and matrix algebra.

    3.3 The determinant of a 2×2 matrix.

    3.4 Invertible 2×2 matrices.

Relevant sections in the online class notes: Sections: 4.2, 4.3, 5.1, 5.2 and 5.3.

Relevant assignments: 7, 8, 9, 10, 11, 12 and 13.

Important concepts: Vector fields; flow of two–dimensional vector fields; linear functions; matrices; determinant of a 2×2 matrix; invertible matrices.

Important skills:

- Know how to compute and sketch flows of vector fields.

- Know how express a second order differential equation as a two–dimensional system of first–order equations.

- Know how to add and multiply matrices.

- Know how compute determinants of 2×2 matrices.