

## Math 2431

Here are some of the topics discussed before the first exam:

- vectors in  $\mathbb{R}^n$ , matrices
  - addition, multiplication by a scalar
  - product of matrices, and matrix  $\times$  vector; properties (linear maps = matrix maps)
  - norm and dot product of vectors, angles and areas
- systems of linear equations:  $Ax = b$ 
  - row echelon form via Gauss elimination
  - reduced row echelon form is unique
  - finding solutions
  - rank
  - consistent and inconsistent systems
  - if consistent: # of param's = # unknowns – rank  $A$
  - superposition (§3.4)
  - solutions for low-dimensional systems
- matrices, linearity, inverses
  - linear maps (= matrix maps)
  - linear maps in  $\mathbb{R}^2$
  - computing inverses (via row reduction)
  - solving  $Ax = b$  with  $A^{-1}$
  - 2 x 2 determinants and inverses;  $\text{area}(A(P)) = |\det(A)| \text{area}(P)$
- systems of ODE's
  - one ODE, initial value problems ( $x' = f(x, t)$ ,  $x(t_0) = x_0$ )
  - $x' = \lambda x \implies x(t) = x_0 e^{\lambda t}$
  - graphic representations: phase-space and time-series portraits