Review sheet for 1st exam, which is Monday 10/4

Problem session

Saturday (tomorrow) 10-11:30
EMCB 112

Chapter 1: Methods to solve certain 1st order DE's

- integration, for $\frac{dy}{dx} = f(x)$
- position, velo, accel, when accel is a fun of $t$ alone.
- separable DE's
- growth & decay (exponential)
- populations, radioactive decay, Newton's law of cooling (with constant ambient temp.)
- drug elimination, rumor propagation, disease spread.
- NO TORRICELLI ON EXAM

Linear 1st order DE's
- Mixing problems
- Slope fields and phase diagrams to understand qualitative behavior of solns
- Without knowing formula for solution fun.
- How to draw these, especially for autonomous DE's.

Chapter 2: Applications in depth

- Population models: logistic, doomsday/extinction, harvesting logistic
- Understand derivations, how to find solutions (by separating variables),
- How to plot slope fields & phase portraits, how to find equilibrium solutions and evaluate stability/instability.
- Equilibrium solutions & stability for general 1st order autonomous DE's.
- Acceleration-velocity models, especially linear drag (force proportional to velocity).
- NO NUMERICAL METHODS (2.4-2.6) ON EXAM.

Chapter 3: Linear systems and matrices

- Solving linear systems by creating the augmented matrix, using elementary row ops to get rref; deducing solution by backsolving.
- Geometric meaning of linear systems in 2 or 3 variables
- Matrix algebra: addition, scalar multiplication, matrix multiplication
- What algebra rules hold, and which one(s) don't.

- Matrix inverses.
- How to compute via row operations
- How to solve linear systems with the inverse matrix, if the inverse exists.

- Determinants
- How to compute with cofactors
- How to compute with row ops
- Cramer's rule
- Adjoint formula for the inverse, esp. 2x2 & 3x3 cases.