

# SCOPE OF MIDTERM EXAM

CEE 361-513: Introduction to Finite Element Methods

Thursday Oct. 19

The midterm exam will take place in Friend 008 from 11:00am-12:20pm on Thursday October 26th. The midterm exam will be closed book and closed notes. Non-conceptual formulas (i.e.  $\mathbf{K}_{fw} = 12/EI \dots$ ) will be provided if needed). Below are *some* (not all) possible topics of relevance for the mid-term. More generally, anything that has been covered until the end of Lecture 11 on Thursday October 19th is of relevance.

- Vectors and vector algebra
- Tensors and tensor algebra
- PDEs
  - Classification of PDEs
  - Classification of differential problems
  - Classification of boundary conditions
- Matrix structural analysis:
  - Truss elements; governing equations, 1-d elements, and  $n - d$  elements
  - Frame elements; governing equations, 1-d elements, and  $2 - d$  elements
  - Different constraints (eg. hinges, sliding on planes etc ...)
  - Direct stiffness method for the assembly of global equations
- Finite element methods:
  - The road map of finite element methods
  - Strong form
  - Weak form
  - Variational formulation
  - Matrix form
  - The element point of view
  - Linear shape functions