Assignments
Continuum Mechanics
MME-203

Note: You must turn in the assignments separately before the end of the sessionals. Use notational conventions adopted in Bechtel for your derivations. Late submission will not be accepted.

Assignment 1 Following the outline in Bechtel, show that the set L of all second order tensors is a vector space and specifically a nine-dimensional vector space. [10]

Assignment 2 For the cylindrical polar coordinate system ($\theta^1 = r, \theta^2 = \theta, \theta^3 = z$). (a) Determine the covariant basis $\mathbf{g}_i = \mathbf{g}_1, \mathbf{g}_2, \mathbf{g}_3$ (b) Determine the contravariant basis $\mathbf{g}^i = \mathbf{g}^1, \mathbf{g}^2, \mathbf{g}^3$ (c) Determine the relation between the physical components v_r, v_θ, v_z, the covariant components v_1, v_2, v_3, and the contravariant components v^1, v^2, v^3, of a vector $\mathbf{v}$. (d) Determine grad($\mathbf{v}$). (e) Determine div($\mathbf{v}$). [25]

Assignment 3 For the cylindrical polar coordinate system ($\theta^1 = r, \theta^2 = \theta, \theta^3 = z$). (a) Determine the relation between the physical components and the contravariant components of a tensor $\mathbf{T}$. (b) Determine the Christoffel symbols Γ^i_{jk}. (c) Determine div($\mathbf{T}$). [15]