**Due: 8:30 a.m. November 23, Thursday, 2021(No late homework accepted)**

1.1 [25 points] (*Hyperelastic material*) Using the results derived in homework 4 and the material properties listed in Table 3.7 of the Allen Bower book, plot graphs showing the $e_1$-directional Cauchy (left panel) and nominal (right panel) stresses as a function of stretch ratio $\lambda$ for each of (a) a Neo-Hookean material; (b) a Mooney-Rivlin material; (c) the Arruda-Boyce material and (c) the Ogden material when subjected to ***uniaxial*** tension ($0.5 < \lambda < 2$).

2.1. [25 points] Repeat problem 1.1. for ***biaxial*** tension (plot stresses in the $e_1$-direction only).

3.1 [20 points] (*Viscoelastic material – Maxwell model*) Given a viscoelastic material, we impose ***constant stress*** $\sigma_0$ at $t = 0$. Derive the constitutive equation using the ***Maxwell model*** (i.e., express strain $\varepsilon$ as a function of stiffness $k$, damping factor $\eta$, time $t$, and given stress $\sigma_0$).

4.1 [10 points] (*Viscoelastic material – Maxwell model*) Plot the strain of this viscoelastic material as a function of time $t$ (0 to 600 s), given $\sigma_0$ = 1 MPa, $k$ = 0.1 GPa, and $\eta$ = 20 GPa-s. Which behavior does this model represent, retarded elastic behavior or steady-state creep behavior?

5.1 [20 points] (*Viscoelastic material – Maxwell model*) Given a viscoelastic material, we impose ***constant strain*** $\varepsilon_0$ at $t = 0$. Derive the constitutive equation using the ***Maxwell model*** (i.e., express stress $\sigma$ as a function of stiffness $k$, damping factor $\eta$, time $t$, and given stress $\varepsilon_0$).