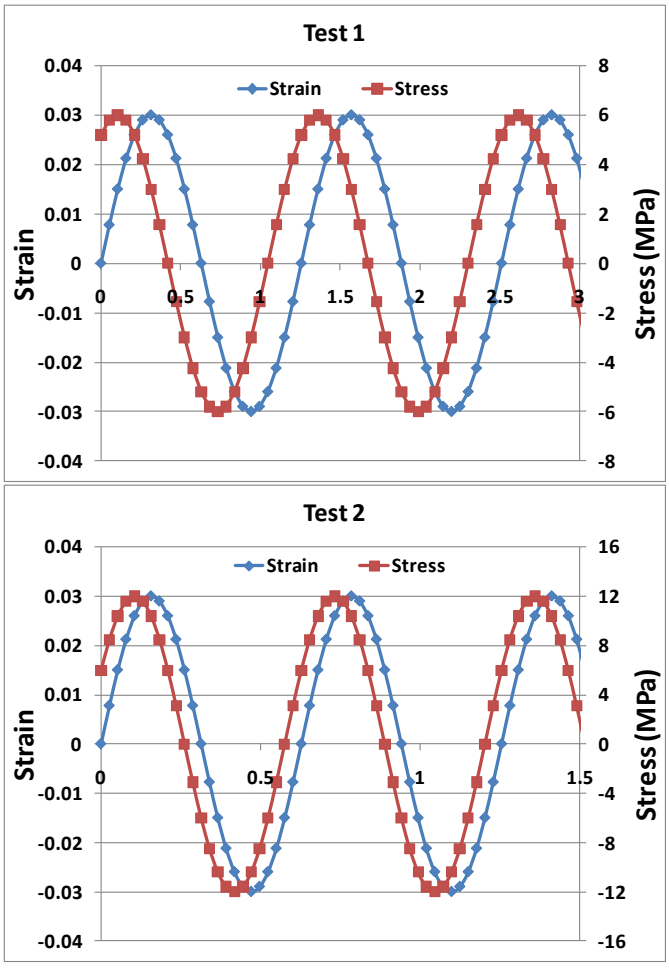
BIOE 404 –Biomechanics **Fall 2014**

Date Assigned: Nov 15 **Date Due: 21**

HOMEWORK ASSIGNMENT #7

1. Suppose you're interested in comparing the mechanical behavior of healthy and osteoarthritic cartilage tissues. You obtain two specimens of knee cartilage, one from a donor who died from cancer but had otherwise healthy knees, and one from a donor who underwent total knee replacement due to osteoarthritis. You test these tissues under compressive creep loads of 2N. Data are posted on Canvas. Using MATLAB, perform a curve fit of the creep to obtain parameters for the Kelvin-type standard viscoelastic solid: E_1, E_2, and μ. The healthy cartilage tissue specimen has an initial height of 1.16mm and cross sectional area of 3.65mm^2. The osteoarthritic cartilage tissue specimen has an initial height of 1.32mm and cross sectional area of 3.79mm^2. Report the analysis details from the Curve Fit Toolbox and print out a plot of the curve fit. Graph healthy vs osteoarthritic for the three parameters. Explain your interpretation of the data.



2. Two dynamic mechanical analysis test results of the same specimen are shown above. Note the different horizontal and vertical scales.
   a. What do the time scales tell you about the difference in testing procedure?
   b. Determine the storage and loss moduli for each of the two tests.
   c. Based on the data, interpret the difference in mechanical behavior in terms of elastic and viscous contributions.