HW#6 ME 4210 Due Date: Friday, October 23, 2015

1. For the given off axis stress state, determine the allowable range of shear stress, τ_{xy} , based on Maximum Stress criterion

$$\begin{Bmatrix}\sigma_x\\ \sigma_y\\ \tau_{xy}\end{Bmatrix} = \begin{Bmatrix}65\\ -160\\ -\end{Bmatrix}\text{MPa}$$

$S_L^+ = 1000$ MPa $S_L^{(-)} = 500$ MPa $S_T^{(+)} = 45$ MPa $S_T^{(-)} = 145$ MPa $S_{LT} = 57.2$ MPa

$\theta = 60^0$

2. Evaluate whether the following stress state causes failure based on
   a. Maximum Strain criterion, if so, state the mode of failure
   b. Maximum Strain criterion, if so, state the mode of failure
   (Assume linear elasticity until failure)

$$\begin{Bmatrix}\sigma_x\\ \sigma_y\\ \tau_{xy}\end{Bmatrix} = \begin{Bmatrix}75\\ -150\\ -10\end{Bmatrix}\text{MPa}$$

$S_L^+ = 1000$ MPa $S_L^{(-)} = 500$ MPa $S_T^{(+)} = 45$ MPa $S_T^{(-)} = 145$ MPa $S_{LT} = 57.2$ MPa

$E_1 = 163$ GPa GPa $E_2 = 11.31$ GPa $G_{12} = 5.50$ GPa $v_{12} = 3.13$ $\theta = 60^0$

3. Write a MATLAB function that imports
   (1) Stress state, (2) strengths, (3) Elastic Properties and (4) lamina orientation from an Excel spreadsheet to determine whether a lamina fails based on
   a. Maximum Stress Criterion
   b. Maximum Strain Criterion

- Test the accuracy of your code using the given stress state and mechanical properties of previous question.