

## Homework: Principal Stresses

Follow format of HW as given at

[http://www.eng.usf.edu/~kaw/class/programming/homework/sample\\_homework.htm](http://www.eng.usf.edu/~kaw/class/programming/homework/sample_homework.htm)  
for Sample HW for assignments after Test#1

Affidavit Sheet

Pseudo-code

Flow Chart ([skip the flow chart for this assignment](#))

Mfile for the function

Published Mfile to test the function

The three principal stresses  $\sigma_1, \sigma_2, \sigma_3$  for the stress state

$$[\sigma_x, \sigma_y, \sigma_z, \tau_{xy}, \tau_{yz}, \tau_{zx}]$$

at a point are given by the solution of the nonlinear equation

$$\sigma^3 - J_3\sigma^2 - J_2\sigma - J_1 = 0$$

where

$$J_1 = \sigma_x\sigma_y\sigma_z + 2\tau_{xy}\tau_{yz}\tau_{zx} - \sigma_x\tau_{yz}^2 - \sigma_y\tau_{zx}^2 - \sigma_z\tau_{xy}^2$$

$$J_2 = \tau_{xy}^2 + \tau_{yz}^2 + \tau_{zx}^2 - \sigma_x\sigma_y - \sigma_y\sigma_z - \sigma_z\sigma_x$$

$$J_3 = \sigma_x + \sigma_y + \sigma_z$$

Write a MATLAB function to find the principal stresses, if the stress state is given as a vector of elements. The input to the function would be a vector of stress state. The output would be a vector of the principal stresses  $[\sigma_1, \sigma_2, \sigma_3]$ .

Use  $[120, 60, 70, -45, 49, 53]$  for submission purposes for the test mfile.