**ENGR 2011: Engineering Analysis and Applications**

**Homework No. 7: Eigenvalues, Eigenvectors and Linear Dynamical Systems**

**Goal:** Demonstrate that you understand the computations involved in inverting a matrix, including the cofactor expansion.

**Textbook Problems:**  3.3.1(a)-(h), 3.3.3, 3.3.5, 3.3.8, 3.3.20, 3.3.29

Note: Check your solution for 3.3.1(a)-(d) with analytic solutions, and then use your Python code to do 3.3.1(e)-(h). Do not do 3.3.1(i).

Also, explain why a symmetric matrix has real eigenvalues.

**Computer Problems:**

Use Python to verify your answers.

Reproduce these examples:

**https://pythonnumericalmethods.berkeley.edu/notebooks/chapter15.04-Eigenvalues-and-Eigenvectors-in-Python.html**

You might find this site useful also:

[**https://www.emathhelp.net/en/calculators/linear-algebra/eigenvalue-and-eigenvector-calculator/**](https://www.emathhelp.net/en/calculators/linear-algebra/eigenvalue-and-eigenvector-calculator/)

Find the eigenvalues and eigenvectors for these matrices:

$A=\left[\begin{matrix}10&6&5\\3&2&1\\-10&-5&-3\end{matrix}\right]$ , $B=\left[\begin{matrix}5&-3&2\\15&-9&6\\10&-6&4\end{matrix}\right]$, $C=\left[\begin{matrix}4/5&-3/5&0\\3/5&4/5&0\\1&2&2\end{matrix}\right]$

Explain whether your answers make sense.