

**PHYS 511: Computational Modeling and Simulation - Fall 2016**  
**Assignment #1, due Friday September 28, before class**

Getting familiar with Fortran and LAPACK

1. Write a Fortran (or C) program that reads a real square symmetric matrix from a text/data file (say `matrix.dat`) and finds all its eigenvalues. Do not assume that you know the size of the matrix in advance. This must be determined based on the content of the file. The elements of the matrix in the file are arranged in lines and columns and are separated by spaces, and there are no empty lines. The most suitable LAPACK subroutine for solving for eigenvalues of a symmetric matrix is DSYEV.
2. Use this program to find the eigenvalues of the following matrix (you will need to create file `matrix.dat` with the corresponding matrix in it)

$$\begin{pmatrix} 2 & 1 & 0 \\ 1 & 3 & 1 \\ 0 & 1 & 2 \end{pmatrix}$$

3. Put the source file of your program as well as a file with the eigenvalues you determined (`report.txt`) in subdirectory `as01` in your google-drive directory that is shared with the instructor. You may include other files if you find it necessary. Any comments/descriptions should be written in file `report.txt`