CPS 5401 Fall 2014 Name _____
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Using LAPACK Routines

Learning objectives: After completing this lab, you should be able to

- Describe the structure and naming conventions of LAPACK
- Identify the appropriate LAPACK routine to use to solve a given problem type for a given matrix type
  for problem types
  - Solution of a linear system of equations
  - Solution of a linear least squares problem
  - Find eigenvalues and eigenvectors of a matrix
  - Find singular values and singular vectors of a matrix (SVD decomposition

  and matrix types
  - Symmetric
  - Triangular
  - General
  - Etc.
- Use the LAPACK documentation to call the selected routine correctly from your main program

For background, please see http://www.mathworks.com/moler/chapters.html

- Linear Equations
- Least Squares
- Eigenvalues and Singular Values

See also the UTEP Research Cloud User Documentation

Exercises:

1. Compile and run the Fortran LAPACK test program
   gfortran –o lapack_prb lapack_prb.f90 –llapack –lblas
   ./lapack_prb

2. Compile and run the C example that solves a linear system
   gcc –o dgesv_ex –Ddgesv=dgesv_ dgesv_ex.c –llapack –lblas
   ./dgesv_ex

3. Compile and run the C example that solves a linear least squares problem
   (need lapacke_mangling.h)
   gcc –o dgels_example dgels_example.c –llapacke –llapack –lblas –I.
   ./dgels_example

4. Compile and run the C example that computes all eigenvalues and eigenvectors of a real symmetric matrix.

5. Try the Fortran examples at www.nag.com/lapack-ex/lapack-ex.html