

**Statistics 624: Statistical Computing**  
**Homework # 10**

**Due Friday, 19 Oct., 4pm**

In this assignment, please complete, organize, and turn in **electronically** to `stat624@stat.byu.edu`.

This assignment demonstrates the Cholesky Factorization.

1. Write a Cholesky decomposition function in C and test the function on the matrix  $\mathbf{A}$ ,

$$\mathbf{A} = \begin{pmatrix} 3 & 0 & -3 \\ 0 & 6 & 3 \\ -3 & 3 & 6 \end{pmatrix}$$

2. Use your Cholesky program to calculate the determinant of the matrix  $\mathbf{A}$ .
3. Use your Cholesky program in another program which will calculate the Least Squares Estimator of  $\beta$  for the model

$$\mathbf{y} = \mathbf{X}\beta + \varepsilon,$$

where  $\mathbf{y}$  is the first column in the data file `chemosimple.dat` and  $\mathbf{X}$  is composed of the next three columns in `chemosimple.dat` with an augmented column of 1's (for the intercept).

4. Calculate the determinant of the  $\mathbf{X}^T\mathbf{X}$  matrix with your C code.