

0. Read sections 11.3, 11.4 A.6, and A.7 in the book.
1. Page 363, #2.9.
2. Page 369, #3.2. Use the program you wrote in Assignment #3 for this one. Write a very brief description (no more than a short paragraph) of your methods, and report your results.
3. Page 370, #3.6 (You may want to read Appendix B.5 starting on page 696.)
4. (a) Find an LDL^T factorization of the following symmetric positive-definite matrix

$$A = \begin{bmatrix} 1 & 2 & 4 \\ 2 & 5 & 6 \\ 4 & 6 & 22 \end{bmatrix},$$

that is, write $A = LDL^T$ where L is lower-triangular, and D is diagonal.

- (b) Rewrite the LDL^T factorization to form an LL^T (i.e. Cholesky) factorization.
- (c) Use either LDL^T or the LL^T the factorization of the above matrix to solve $A\mathbf{x} = \mathbf{b}$, where

$$\mathbf{b} = \begin{bmatrix} 1 \\ 6 \\ -6 \end{bmatrix}.$$

Hint: Use forward substitution and back substitution.

5. **Bonus (1 point):** Write a program that computes the Cholesky factorization. It is OK to look online or at other resources to get ideas, but then close the webpage, book, etc., and write your code on your own. You will learn more and grow stronger if you do it this way.