

Analysis of Numerical Methods I
MATH 6610 – Section 001 – Fall 2017

Homework 3

LU and Cholesky factorizations

Due Wednesday, November 1, 2017

Trefethen & Bau III, Lecture 20: # 20.1
Trefethen & Bau III, Lecture 21: # 21.6
Trefethen & Bau III, Lecture 22: # 22.3
Trefethen & Bau III, Lecture 23: # 23.1
Trefethen & Bau III, Lecture 24: # 24.1, 24.4

Additional problems:

P1. Let $P \in \mathbb{R}^{n \times n}$ be a permutation matrix.

- (a) Prove that P^T is also a permutation matrix.
- (b) Prove that $P^T = P^{-1}$.
- (c) Prove that if P_1 and P_2 are both permutation matrices, then $P_1 P_2$ is also a permutation matrix.
- (d) Is it true in general that $P^2 = P$? If so, prove it. If not, give a counterexample.

P2. Let $A \in \mathbb{C}^{n \times n}$ be invertible. Prove that the *LU* decomposition algorithm with partial pivoting always successfully computes $PA = LU$.