

## Math 243A, Homework due 11/22/2012

1. Prove the following formulas for triangular factorizations of  $T_N$ .

(a) The Cholesky factorization  $T_N = B_N^T B_N$  has a upper bidiagonal Cholesky factor  $B_N$  with

$$B_N(i, i) = \sqrt{\frac{i+1}{i}} \quad \text{and} \quad B_N(i, i+1) = \sqrt{\frac{i+1}{i}}.$$

(b) The result of Gaussian elimination with partial pivoting on  $T_N$  is  $T_N = L_N U_N$ , where the triangular factors are bidiagonal:

$$L_N(i, i) = 1 \quad \text{and} \quad L_N(i+1, i) = -\frac{i}{i+1},$$

$$U_N(i, i) = \frac{i+1}{i} \quad \text{and} \quad U_N(i, i+1) = -1.$$