

**University of Massachusetts Lowell**  
**Department of Electrical and Computer Engineering**  
**16.520 Computer Aided Engineering Analysis**  
**Problem Set 4**

1. Given the transcendental functions  $e^{\pm x}$ , Determine the eight term Chebyshev expansion for valid for  $0 \leq x \leq 1$ .

$$e^x = \sum_{n=0}^7 a_n T_n(z)$$

$$e^{-x} = \sum_{n=0}^7 b_n T_n(z)$$

where  $z = 2x - 1$ .

- a. The coefficientis are to be evaluated using the collation method at the Gauss-Lobato points.
- b. Extend your result for larger values of  $|x|$ . This can be done by noting that

$$x = (n+d)\ln(10)$$

where  $n$  equals the integer part of  $x/\ln(10)$  and  $d$  is the decimal part. Place your result in a function "double cheb\_exp ( (double) x)".