KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
COLLEGE OF COMPUTER SCIENCES & ENGINEERING

COMPUTER ENGINEERING DEPARTMENT

COE-341 – Data and Computer Communication
Assignment # 1 - Due Date: Nov 13th, 2007)

1) **Textbook Problems: 2.2, 2.7, and 3.6, 3.7, 3.13, 3.14, 3.20, 3.23, and 3.24.**

2) Consider the Sawtooth wave function listed in table B.1 of Appendix B (page 793) of the text book. Assume $A = 1$, and T (period) = 1. For parts (d) and (h) you should SHOW and SUBMIT your own MATLAB code for parts (d) and (h). You may want to use Matlab for other parts too.

   a. Write a mathematical expression for $s(t)$

   b. Compute the Fourier series expansion for $s(t)$

   c. Write an expression for s_e(3)

   d. Using Matlab, plot the original $s(t)$ and s_e(3) on the same graph for $-3T/2 \le t \le 3T/2$. Is s_e(3) a good approximation for $s(t)$? For plotting use solid red line for s_e(3) and dashed blue line for $s(t)$.

   e. Find the total power of s(t)

   f. Find n* such that s_e(n = n*) contains 95% of the total power in the original signal

   g. Write and expression for the power spectral density function for $s(t)$

   h. Using Matlab, plot the power spectral density function for $s(t)$ – include frequencies upto 15 times the fundamental frequency.