Math 370: Numerical Analysis

Group Activity **TWO** MATLAB and Approximation Theory
April 8, 2009 *Prof. R. Buckmire*

Group Members: **SCORE: /10**

INSTRUCTIONS: In small groups of two or three use MATLAB to answer the given questions. Write down what steps the group took to solve the problem, particularly all MATLAB commands used. Only one sheet per group.
GOAL: To demonstrate your familiarity with MATLAB and ability to use the given software to solve a specific problem, in this case fitting a curve to a non-linear set of data.

x	1.0000	2.0000	4.0000	5.5000	7.0000
y	2.2361	10.9329	24.6765	42.8382	65.0486

Consider the experimental data above to postulate a relationship of $y = P(x) = c_1 x^{c_2}$ between the input and output experimental data.

a. [*2 points*] Derive transformations involving $Y = Y(x, y)$ and $X = X(x, y)$ which change the nonlinear relationship $y = c_1 x^{c_2}$ into a linear one between Y and X

b. [*4 points*] Use MATLAB's `linefit` function or some other calculations to find c_1 and c_2. (Show all your calculations, such as MATLAB commands and what output it produces.)

c. [*2 points*] What is the least square error between the experimental data and the curve of best fit? That is, evaluate $E = \sum_{k=0}^{n} (y_k - P(x_k))^2$

d. [*2 points*] What are the MATLAB commands to plot the data and the curve of best fit? Attach a print out, if possible.