

**Chemical Engineering 201**  
**Fall 2008**  
**Computer HW 8**

We want to find the roots of the following equation (with x in radians):

$$x^2 \sin(x) + x^3 e^x - x \cos(x) = 7$$

First, rearrange this equation so it is equal to zero and then plot y(x) versus x over a range large enough to show two roots (places where the equation is equal to zero).

Then write a program in Visual Basic. Your program should use the Newton-Raphson Method to find the roots. You should input the function directly into the program and not in the spreadsheet. The program should only need a single guess for the root ( $x_0$ ) that you send to the function from the plot you made in the first part. Your program should iterate through a looped series of instructions to find the new  $x_{i+1}$  until it reaches some stopping criteria you set in the program. Then your program should send the result back to the spreadsheet.

Find two roots for the equation using your program.

Verify on your calculator that these two roots do indeed satisfy the original equation.

You must submit a hard copy printout of your plot and your two roots in addition to emailing a copy of your VB program with the filename as Firstname-lastname.xls to [blowers@engr.arizona.edu](mailto:blowers@engr.arizona.edu)