Math/CS 466/666 Quiz 2 Version A

1. Please answer one of the following questions:

(i) Write or modify a computer program to implement Taylor's second order method for solving the ordinary differential equation initial value problem

$$\frac{dy}{dt} = e^{-y^2} \qquad \text{with} \qquad y(0) = 0.$$

Use your program to find $y(3)$ to 5 significant digits.

(ii) Write or modify a computer program to implement Newton's method for systems to solve

$$\begin{aligned} x_1 + \cos(x_1 x_2 x_3) &= 1 \\ (1 - x_1)^{1/4} + x_2 + 0.05x_3^2 - 0.15x_3 &= 1 \\ -x_1^2 - 0.1x_2^2 + 0.01x_2 + x_3 &= 1 \end{aligned}$$

starting with $(x_1, x_2, x_3) = (0.5, 0.5, 0.5)$. Print the first 5 iterations.

2. [Extra Credit and Math/CS 666] Work the other problem, the one you didn't do above, and turn it in for exact credit.

Submit your program and output using the commands

```
$ submit -q1 prog1.c
$ submit -q2 output1.txt
```

Here `prog1.c` answers the question you selected above and `output1.txt` is the respective output. The output may be obtained by compiling and running the program as

```
$ gcc -std=gnu99 -o prog1 prog1.c -lm
$ ./prog1 >output1.txt
```

Submit the extra-credit problem using

```
$ submit -q3 prog2.c
$ submit -q4 output2.txt
```

If you wish to change any part of your submission simply retype the appropriate submit command again. You may check each of your submissions with the command

```
$ submit -pn
```

where `n` is equal the number used in submit command.