Project 4 — **Due**: October 24, 2002
CMSC 104, Section 0801 — Problem Solving and Introduction to Programming

This project is a combination of written work and programming. For each section read and follow the instructions carefully. You should turn in this worksheet, a printout of your program for problem #4, and you submit your source code as usual to the TA via email at `pliu2@umbc.edu`. All work is due on October 24, 2002 at 5:30 pm.

SECTION 1: Understanding Mathematical Formulas in C

1. (5) Rewrite the following mathematical formulas in proper C programming format.

   a. $x = b^2 - 4ac$

   b. $y = a + b - c$

   c. $y = \frac{a+b}{c+d}$

   d. $z = \frac{1}{1+x^2}$

   e. $c = -a(x + y)$

2. (5) Given the constants and variable declarations

```
#define PI 3.14
#define MAX_I 1000
...
double x, y;
int a, b, i;
```

indicate which of the following statements are valid, and find the value stored by each valid statement. Also indicate which are invalid and explain why. Assume that `a` is 3, `b` is 4, and `y` is -1.0 for all problems. (Hint: If you are having trouble, you are encouraged to actually program!!!)

   a. `i = a % (a / b);`

   b. `i = (MAX_I - 990) / a;`

   c. `x = b / a;`

   d. `x = a % (990 - MAX_I);`

   e. `i = a % (MAX_I - 990);`

SECTION 2: C Programming with Mathematical Formulas

3. In the space provided on this page, write the pseudocode for an algorithm that will prompt the user for input, and then calculate and report the average velocity of a particle traveling along a line. The user should input the starting point p_1, the ending point p_2, the starting time t_1, and the ending time t_2. The formula for average velocity, v, of a particle traveling on a line between points p_1 and p_2 in time t_1 to t_2 is

$$v = \frac{p_2 - p_1}{t_2 - t_1}.$$

Once you have completed the pseudocode description of your algorithm, write a C program that will have the same functionality. Your C code should be handed in as well as sent to the TA for grading.