COS126: General Computer Science	**Spring 1996**
Sample Exam 1	
Review: March 4, 1996	

Instructions: *This exam is open-book. You may use your personal notes, any handouts and lecture notes from this course, the course reader, and "The C Programming Language" by Kernighan and Ritchie.* **No other materials are allowed.** *You have 90 minutes for this exam. There are four problems. Write your answers in an exam booklet. Be sure that your name and precept number are on the front of the booklet and printed legibly. Write and sign the honor code pledge.*

Problem 1, 28 points:

1. *(8 points)* What do the following lines of C code print?

```
printf(``%d'', 4/3);
printf(``%f'', 4.0/3.0);
```

2. *(20 points)* Find all the errors in the following C program. Copy the offending lines in your answer book and also describe briefly why they are erroneous.

```
#include <stdio.h>
#define n 100
#define int a[n];
void square(int j)
{ return j*j;}
void main(void)
{
  float x, y=100;
  int i;

  for(i=5; i<n; i= i+5)
     {x = i + y;}

  if (x > y)
      y = x;
      x = y + x;
  else
      x = y + x;
  n=200;
  for(i=5; i<n; i= i+20)
   {y = square(y);}
}
```

Problem 2, 22 points: Write a program that for an array A finds the average of the values in the array and then counts the number of elements in the array that are no larger than this average. This count should be printed to the screen. Here we give you a framework to start you off. Remember to add declarations as needed as well as other C statements.

```
#include <stdio.h>
#define N 100

void main (void);
{ int i;
  int A[N];

  /* read the array values from the keyboard */
  printf("Enter %d array values.\n", N);
  for (i = 0; i < N; i = i+1)
     { scanf("%d", &A[i]; }

  /*fill in the rest*/

}
```

Problem 3, 22 Points: Write a function `int_ceiling` that takes two integers, a and b as arguments and returns the *smallest* integer that is not smaller than the rational number $a \div b$. For example, `int_ceiling(1,5)` returns 1; `int_ceiling(26,5)` returns 6; `int_ceiling(12, 3)` returns 4.

Problem 4, 28 Points:

1. *(8 points)*
   Write the decimal number `321` in hexadecimal.
   Write the hexadecimal number `1234` in decimal.
2. *(20 points)* What does the following Toy program do? Note that the program contains a load instruction, and you do not know the contents of memory locations other than 0x30 through 0x3C, so you need to describe the function performed in general terms.

```
30:  B000
31:  B101
32:  B72F
33:  673C
34:  9670
35:  6639
36:  2606
37:  6639
38:  4702
39:  0000
3A:  2771
3B:  5033
3C:  4702
3D:  0000
```