ID_____NAME_____
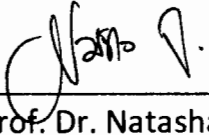
KING MONGKUT's UNIVERSITY OF TECHNOLOGY THONBURI

Computer Engineering Department
Final Examination, First Semester 2016

November 25, 2016   13:00-16:00

CPE 100 Computer Programming for Engineers   1st year Automation Engineering

Instructions

1.   This is a closed book exam.
2.   There are totally 2 parts in 10 pages with a total of 110 points.
3.   The answers must be written in the provided spaces.
4.   Any electronic device is not allowed.
5.   Read questions carefully.
6.   Write your name and your student number on every page.

Instructor Jaturon Harnsomburana, Ph.D.
02-470-9080

This examination has been approved by the Department of Computer Engineering.

_____
Assoc. Prof. Dr. Natasha Dejdumrong
Program Chairperson

PART ONE: 15 problems (60 pts)

1. Order the following dataypes from smallest size to largest (5pts)
   float, short, double, char, int

2. How many byte is needed to store data of struct data_t type? (4pts)
   struct data_t { char name[20]; double x; double y; short int ID; };

3. What are the datatype of parameters and return type of this function?(5pts)
   a. int tolower(int c)

   b. void main(int argc, char *argv[])

4. What does the following C code do?(6pts)
   a. #define   MAX   100

   b. long sum=0;

   c. printf("%0.2f\n", 12.345);

This part of C code is for question No. 5-9

```
1: #include <ctype.h>
2: int main(){
3:   char ch;
4:   do{
5:       printf("?");
6:       scanf("%c",ch);
7:     switch(ch){
8:       case 'a': printf("ANT\n"); break;
9:       case 'H': printf("hello\n");
10:       case 'd': printf("dArlIng\n"); break;
11:       default: printf("error\n"
12:     }
13:   } while(tolower(ch)!='q');
14:   printf("bye");
15:}
```

5. What is wrong with line #6 and how to fix it?(2pts)

6. What is the output when input an 'a' to this program after fixing the bug? (2pts)

7. What is the output when input an 'A' to this program after fixing the bug?(2pts)

8. What is the output when input an 'H' to this program after fixing the bug?(2pts)

9. what is the output when input an 'Q' to this program after fixing the bug?(2pts)

10. What do you have to include to use exp( ) and log( ) function? (2pts)

11. What does this statement rand()%10+1 do? (2pts)

12. From the following code, determine whether each statements is true or false. Put your answer in the boxes provided. (8pts)

```
#include<stdio.h>
int main()
{
    int x = 10, y = 100%90, i;
    for(i=1; i<10; i++)
    if(x != y);
        printf("x = %d y = %d\n", x, y);
    return 0;
}
```

-4-

    a. The printf() function is called 10 times. ☐

    b. The program will produce the output x = 10 y = 10 ☐

    c. The ; after the if(x!=y) will NOT produce an error. ☐

    d. The program will not produce output. ☐

13. What will be the output of the program?(3pts)
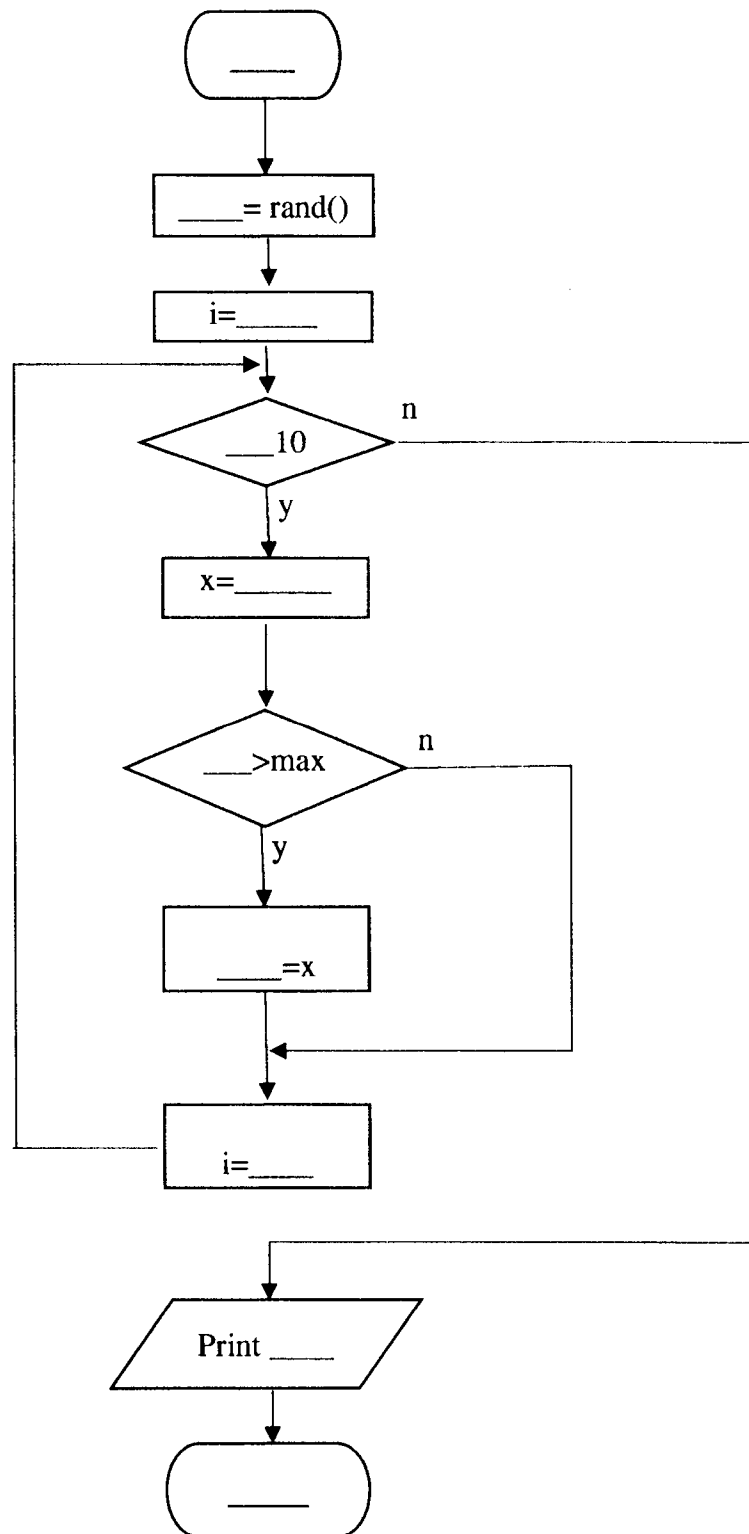
```
#include<stdio.h>
int main()
{
    int k, num=30;
    k = ((num>5)? ((num <=10)? 100: 200): 500);
    printf("%d\n", num);
    return 0;
}
```

14. From the following statement, what is the value of x? (5pts)

x=(4>3)?(5<20)?1:2:(1>2)?3:4;

15. Complete the following flowchart by filling the blanks. The algorithm is to find maximum value from 10 random numbers. (10pts)

```
        ( _____ )
            |
            v
    [ _____ = rand() ]
            |
            v
    [ i = _____ ]
            |
    +------>v
    |   / _____ 10 \-----n----+
    |   \          /          |
    |       | y               |
    |       v                 |
    |  [ x = _____ ]          |
    |       |                 |
    |       v                 |
    |   / _____ >max \---n--+ |
    |   \           /       | |
    |       | y             | |
    |       v               | |
    |  [ _____ = x ]        | |
    |       |               | |
    |       v<--------------+ |
    |  [ i = _____ ]          |
    +-------+                 |
            |                 |
            v<----------------+
      / Print _____ /
            |
            v
        ( _____ )
```

PART TWO: 5 questions (50pts)

1. Write a program that take 3 numbers from user into x, y, z. Reorder the numbers so the smallest number is in x, the middle one is in y, and the largest one is in z. Show the result on screen. (Hint: easier with swap function.)

   Example
   X: 2
   Y: 3
   Z: 1
   X=1 Y=2 Z=3
   X:3
   Y:1
   Z:2
   X=1 Y=2 Z=3

2. Write a program that take input from user as a string. Count the number of vows in the sentence.

3. Write a **function** that take positive integer as input. Calculate the value of sum of $1/2 + 1/3 + ... + 1/n$. If the number is less than 2 return 0 as a result.
   (Hint: recursive function is easier to solve this problem)

$$\sum_{n=2}^{N} \frac{1}{n} = \frac{1}{N} + \sum_{n=2}^{N-1} \frac{1}{n} \qquad N = 2, is \frac{1}{2}$$

4. Write a program that take n as an input. Take n numbers from user and find min and max. Write all input numbers (n is excluded.), min and max in the file 'data.txt'. The input values are between -50 to 50. If the input value is out of range, skip it.

5. Write a program that read input from a file called "numbers.txt". Each line contains a character at the beginning of line to indicate operation. The following numbers in the lines will be the parameters to the operation. The operation can be 'A' to indicate addition or 'M' to indicate multiplication. Example data is given below. There are only two numbers after the operation.

In file: numbers.txt
        A 1.5 2.1
        M 1.1 2.2
        A 2 3
        M 5 8
On screen:
        1.50 + 2.10 = 3.60
        1.10 x 2.20 = 2.42
        2.00 + 3.00 = 5.00
        5.00 x 8.00 = 40.00