**King Fahd University of Petroleum and Minerals**

**Information and Computer Science Department**

ICS 103: Computer Programming in C

**Summer Semester 2009-2010 (Term-093)**

##### Major Exam-I

**Time: 120 minutes Wednesday, July 21, 2010**

|  |  |
| --- | --- |
| **Name:** |  |
| **ID#:** |  |  |  |  |  |  |  |  |  |  |

PLEASE CIRCLE YOUR SECTION BELOW:

|  |  |  |  |
| --- | --- | --- | --- |
| Section | 01 | 02 | 03 |
| Instructor | Mr. AHMAD IRFAN | Dr. FARAG AZZEDIN | Dr. AIMAN EL-MALEH |
| Time | SUMT9:20-10:10am | SUMT10:30-11:20am | SUMT10:30-11:20am |

|  |  |  |
| --- | --- | --- |
| Question # | Maximum Marks | Obtained Marks |
| 1 | 12 |  |
| 2 | 8 |  |
| 3 | 10 |  |
| 4 |  10 |  |
| 5 |  8 |  |
| 6 | 9 |  |
| 7 |  8 |  |
| 8 | 8 |  |
| 9 | 13 |  |
| 10 | 14 |  |
| Total | 100 |  |

 **Notes.** 1. Make sure you have **Eleven** pages including the cover page.

 2. Closed book and notes

 3. Write clearly, briefly and precisely

 4. Cheating will result in ZERO grade

##  Question 1: (12 points)

Fill the blank in each of the following questions:

1. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ translates C programs to machine language.
2. Two most common preprocessor directives are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Software development includes the following steps:

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_,

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ program combines the output of compiler with various library functions to produce an executable file.
2. The expression (double)(10/4) evaluates to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. The expression 10/(int)2.5 evaluates to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. The expression 8<=12-4 evaluates to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. The expression 21/6/2.0 evaluates to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. The expression 12-10%10 evaluates to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
7. The expression 1||!0&&0 evaluates to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Question 2 (8 points)**

Determine all the errors in the following program with clear explanation of the cause of the error:

#include <stdio.h>

#define PI=3.14

void main(void)

{

int i=5;

double c, r;

 scanf(“%f%f”, c, r);

 PI = 3.14159;

 c = c % (PI \* r)

 printf(“i=%d c=%d \n”, i, c);

return 0;

}

**Question 3 (10 points)**

Consider the following program. What will be the output for the different values of x typed by the user.

|  |  |
| --- | --- |
| Value of x typedby user | Program output |
| **1** |  |
| **2** |  |
| **3** |  |
| **5** |  |
| **6** |  |

#include <stdio.h>

int main()

{

 int x;

 printf("Enter a value for x: ");

 scanf("%d", &x);

 switch(x) {

 case 1: x=x+2;

 break;

 case 3: x=x+1;

 case 5: if(x==4)

 x=x+6;

 case 6: x=x+3;

 break;

 default : x=x-1;

 }

 printf("%d\n",x);

 return 0;

}

**Question 4 (10 points)**

Consider the following program. What will be the output for the different values of x typed by the user.

#include <stdio.h>

|  |  |
| --- | --- |
| Value of x typedby user | Program output |
| **3** |  |
| **7** |  |
| **20** |  |
| **10** |  |
| **9** |  |

int main() {

int x;

printf("Enter a value for x >");

scanf("%d",&x);

if(x >= 5 ) {

 if(x < 10){

 if(x > 8)

 printf("A");

 else

 printf("B");

 }

 else{

 if ( x >= 20)

 printf("C");

 else

 printf("D");

 }

}

else

 printf("F");

return 0;

}

**Question 5 (8 points)**

Show the output of the following program in the space provided below it. Each square corresponds to one space.

#include <stdio.h>

int main(void) {

double i=-19.963;

 printf("%6.0f%8.1f\n",i,i);

 printf("%3.2f%5d", i,(int)i);

return 0;

}

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Question 6 (9 points)**

**Write the corresponding mathematical or C expression. Assume that all variables are of type double.**

|  |  |
| --- | --- |
| **C EXPRESSION** | **Mathematical Expression** |
|  |  |
| **sqrt(fabs(2-x)+exp(x))/x\*y+1** |  |
|  |  |

**Question 7 (8 points)**

**Write the equivalent C condition so that each of the following statements is satisfied.**

|  |  |
| --- | --- |
| Statement | Equivalent C condition |
| x is not greater than 100 and y is not even |  |
| x is outside the interval [-5,5] |  |
| x is a lower case alphabetical character |  |
| x and y are less than or equal 50 |  |

**Question 8 (8 points)**

**Assuming that x is declared as int, rewrite the following if-else-if statement using switch statement:**

if(x>=1 && x<=4)

 printf(“Interval 1\n”);

else if (x>=5 && x<=7)

 printf (“Interval 2\n”);

else if (x==8 || x==9)

 printf(“Interval 3\n”);

else

 printf(“Outside the correct range\n”);

**Question 9 (13 points)**

Write a complete C program that prompts the user for the Cartesian coordinates of two points (x1,y1) and (x2,y2) and displays the entered two points along with their distance computed by the following formula and rounded to two decimal places:

$$distance=\sqrt{\left(x2-x1\right)^{2}+\left(y2-y1\right)^{2}}$$

Use appropriate data types for declared variables. Your program should strictly follow the format in the sample execution given below:



**Question 10 (14 points)**

# The National Earthquake Information Center has asked you to write a program implementing the following decision table to characterize an earthquake based on its Richter scale number. Write a complete C program that prompts the user to enter the Richter scale number and then displays the earthquake characterization. Write the minimum number of conditions needed in your program.

|  |  |
| --- | --- |
|  Richter Scale Number (n) | Characterization |
| n < 5.0 | Little or no damage |
| 5.0 ≤ n < 5.5 | Some damage |
| 5.5 ≤ n < 6.5 | Serious damage: walls may crack or fall  |
| 6.5 ≤ n < 7.5 | Disaster: houses and buildings may collapse |
| 7.5 ≤ n  | Catastrophe: most buildings destroyed |

# Sample executions of the program are given below:



