59:006  EPS II

Spring, 2004

Solutions to Sample Exam Questions for First Midterm
Question 1)

a) What is the output for the following lines of code?

```c
int x = 3, y = 5;
printf("%d", x+y);
```

Answer ___8___________

b) Which of the following is syntactically correct and true for the following values?

```c
int x = 0, y = 1, z = 2, true = 1; /* Assume that 0 is FALSE and all other values are TRUE */
(a) ((x && y ) && ( x && z)) == true
(b) ((x & (!y)) || ( x && z)) == true
(c) ((x && (!y)) || (!x) && z)) == true
(d) (((!x) && y ) && (!y) && z) == true
```

Answer ______c)___________

c) What is the output of this code fragment when x=3, y=4, and z=5?

```c
printf("x + y * z = %d\n", x + y * z);
```

Answer ___ x + y *z = 23___________

Question 2)

a) What is the output of the following code?

```c
#include <stdio.h>
int main()
{
    int x = 3, sum = 0;
    while(x<=6)
    {
        sum += x;
        ++x;
    }
    printf("The sum is %d\n", sum);
    return 0;
}
```

Answer _____18___________
b) Draw the flow chart for the following lines of code

```c
int tests, finalscore;
printf( "Is this class easy? ");
printf( "let's see");
for( int tests = 0; tests <= 2; tests++)
{
    if(finalscore >= 90)
        printf( "Of course, a very easy one");
    else
        printf( "The course was easy; I should have practiced more");
}
```

```
Circle

Promt "Is this class easy?"

Promt "Let's see"

test = 0;

False

test <= 2

True

finalscore

False

True

Prompt "Of course, a very easy one"

Prompt "The course was easy; I should have practiced more"

test ++;

End
```
Question 3)

Answer the following questions regarding this incomplete code segment, which will print out the elements of an integer array. The size of the array is not constant. Choose the best answer.

```c
void print_array(…)
{
    int j;
    for(…)
    {
        printf(“array[%d] = %d\n”, j, a[j]);
    }
}
```

What is the correct completed function definition?

a) void print_array( int a[] )
b) void print_array( int a, int size )
c) void print_array( int a[], int size )
d) void print_array( int a[size] )

**Answer** c)

What is the correct completed for-loop statement?

a) for(j = 0; j < size; j++)
b) for(j = 0; j <= size; j++)
c) for(j = 0; j < a; j++)
d) for(j = 0; j < a[size]; j++)

**Answer** a)

How are arrays usually passed to a function in C (as in the above function)?

a) by value
b) as static
c) double-scripted
d) by reference

**Answer** d)
Question 4)

What will the output of this program be?

```c
#include <stdio.h>

int main(void){
    int i = 2, j = 9, z = 5;
    while ( (i<=6) && (j<=4) ) {
        z = z - i + ( 2*j );
        i++;
        j--;
    }
    printf( "The final value of z is: %d\n", z );
    return 0;
}

Answer The final value of z is 5
```

Question 5)

Write the output produced by the following program.

```c
#include <stdio.h>

int main(void) {
    int cntr1, cntr2;
    for (cntr1 = 1; cntr1 <= 5; cntr1++) {
        for (cntr2 = cntr1; cntr2 <= 5; cntr2++) {  
            printf("%d", cntr2);
        }
        printf("\n");
    }
    return 0;
}
```

Answer 1 2 3 4 5
2 3 4 5
3 4 5
4 5
5
The following code is used to collect votes on the world’s fastest car. The F stands for Ferrari, the C for Corvette, and P for the Pinto (supercharged of course). What does line 11 do? Also, write the output of this code if f was entered 400 times, C 100, and P 7000.

```c
#include <stdio.h>

int main (void)
{
    int cars;
    int fCount = 0, cCount = 0, pCount = 0;

    printf ( " Enter the letters for each car:\n");
    printf ( " Enter the EOF character to end the input.\n");

    while ( (cars = getchar() ) != EOF) {
        switch ( cars) {
            case 'F': case 'f':
                ++fCount;
                break;
            case 'C': case 'c':
                ++cCount;
                break;
            case 'P': case 'p':
                ++pCount;
                break;
            default :
                printf ("Incorrect car, enter a new car\n");
                break;
        } 
    }

    printf ( "Car%10s
", "Votes");
    printf ( "Ferrari%10d\n", fCount);
    printf ( "Corvette%10d\n", cCount);
    printf ( "Pinto%10d\n", pCount);
    return 0;
}
```
What does line 11 do?

Accepts inputs, and tests if the loop should be ended.

What is the output?

<table>
<thead>
<tr>
<th>Car</th>
<th>Votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrari</td>
<td>400</td>
</tr>
<tr>
<td>Corvette</td>
<td>100</td>
</tr>
<tr>
<td>Pinto</td>
<td>7000</td>
</tr>
</tbody>
</table>
Question 7)

Will this program compile without warnings? For example, does it need a prototype? If so, then what is its output? If not, then modify the program so that it will compile correctly. You do not need to write the output if you choose to modify this program.

```c
#include <stdio.h>

int cube ( int y );

int main (void)
{
    int x;
    for ( x = 1 ; x <=10; x++)
        printf ( "%d\n", cube(x) );
    return 0;
}

int cube ( int y )
{
    return y * y * y;
}
```

This program needs a prototype as shown above

Answer ____________________
Question 8)

```c
#include <stdio.h>

int myFunction(void);
int speed = 12;
int main(void) {
    int index;
    int speed = 20;
    for (index = 0; index < 2; index++)
        myFunction();
    printf("%d\n", speed);
}

int myFunction(void)
{
    static int speed = 21;
    printf("%d ", speed *=2);
    return speed;
}
```

Trace this program to determine what values will be printed out when this code is executed? Show your work (Circle One)

a) 42 84 84  
b) 42 42 20  
c) 12 12 20  
d) 42 84 20

Answer _______ d)__________
**Question 9)**

In physics, the weight of an object varies with its distance from the center of the earth. The equation for the weight of an object is:

\[ W = G \times M_E \times \frac{m}{r^2} \]

Where \( W \) is the weight, \( G \) is the gravitational constant \((6.673 \times 10^{11} \text{ Nm}^2/\text{kg}^2)\), \( M_E \) is the mass of the earth \((5.98 \times 10^{24} \text{ kg})\), \( m \) is the mass of the object, in kilograms, and \( r \) is the distance from the center of the earth, in meters.

Write a function to find the weight of an object. The function should have two parameters, one for the mass of the object, and one for the distance from the center of the earth.

```cpp
double calcWeight( double mass, double dist )
{
    const double gravConst = 6.673e11;
    const double massEarth = 5.98e24;

    double weight;

    weight = gravConst * massEarth * mass / (dist * dist);

    return weight;
}
```
Question 10)

You have 60 integer scores, which can range from 0 to 100, in an array a[].
The grades have already been entered into the array.
Write a C code fragment that finds and prints; the highest score, the lowest score, and the average score for the 60 scores.
Enter Code Here

```c
int min, max, sum, i;
double average;

min = array[0];
max = array[0];
sum = 0;
for (i = 0; i < 60; i ++)
{
    if(array[i] > max)
        max = array[i];
    else if(array[i] < min)
        min = array[i];
    sum += array[i];
}
average = sum/100.0;
printf("The highest score is %d, and the lowest score is %d, and the average score is %f\n",
        max, min, average);
```
Question 11)

When the following C code is executed, what is printed out?

/* Exam question on arrays */
#include <stdio.h>

int main()
{
    int a[22] = {3}, loop1, loop2;
    for (loop1 = 1; loop1 < 8; loop1+=3)
    {
        for(loop2 = 0; loop2 <= loop1; loop2++)
        {
            a[loop1] = (loop1 % 4) + loop2;
        }
        printf("Array[ %d ] =  %d\n", loop1, a[loop1]);
    }
    return 0;
}

Array[1] = 2
Array [4] = 4
Array [7] = 10

Answer ________________