Faculty of Computer and
Information Sciences
Ain Shams University

Fundamentals of
Structured Programming
2019-2020

Take-Home Assignment 2

Submission via LMS

Question 1:

```cpp
1    #include<iostream>
2    using namespace std;
3
4    #define size 5
5
6    void sum(int arr[])
7    {
8        for (int i = 0; i < size; i++)
9        {
10           cout << "Sum of " << arr[i] << ", " << arr[i + 1] << " is " << arr[i] + arr[i + 1] << endl;
11       }
12   }
13   void main()
14   {
15       int a[size];
16       for (int i = 0; i < size; i++)
17       {
18           cin >> a[i];
19       }
20       sum(a);
21   }
```

This code attempts to display the summation of each number in the array and the number next to it as in the test case:
10 20 30 40 50

Sum of 10, 20 is 30

Sum of 20, 30 is 50

Sum of 30, 40 is 70

Sum of 40, 50 is 90

So, Will it give the correct output?
- A. Yes, there is no problem with the code.
- B. No, it will calculate different output.
- C. Syntax error.
- D. Runtime error.

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Question 2:

```
1    #include <iostream>
2    using namespace std;
3    void swap(int x, int y)
4    {
5        int z = x;
6        x = y;
7        y = z;
8    }
9    int main()
10   {
11       int x = 2;
12       int y = 3;
13       swap(x, y);
14       cout << x << " " << y << endl;
15       return 0;
16   }
```

This code should swap x and y. what is the correction?

A. change the function definition to: void swap(int &x, int &y) and don't change the function call

B. change the function definition to: void swap(int *x, int *y) and don't change the function call

C. don't change the function definition and change the function call to: swap (&x, &y)

D. don't change the function definition and change the function call to swap: (*x, *y)

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Question 3:

```
1    #include <iostream>
2    using namespace std;
3
4    #define size 5
5    int sum_arr(int* arr1, int* arr2)
6    {
7        int sum1 = arr1[0] + arr2[0];
8        int sum2 = arr1[size - 1] + arr2[size - 1];
9        return sum1;
10       return sum2;
11   }
12
13   int main()
14   {
15       int numbers1[] = { 10, 20, 30, 40, 50 };
16       int numbers2[] = { 100, 200, 300, 400, 500 };
17       cout << sum_arr(numbers1, numbers2);
18   }
```

We want to calculate two values (sum1 and sum2). sum1 is the summation of the first 2 elements in the two arrays and sum2 is the summation of the last 2 elements in the two arrays.

   A. The code is correct and will display 110 and 550
   B. The problem is returning two values, the correction is passing both sum1 and sum2 by reference
   C. The problem is returning two values, the correction is that the function returns sum1 and pass sum2 by reference
   D. B and C are both correct

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Question 4:

```
1    #include <iostream>
2    using namespace std;
3
4    #define ArraySize 6
5    |
6    void function1(int Arr[], int index, int val)
7    {
8        for (int i = index; i < ArraySize - 1; i++)
9        {
10           Arr[i] = Arr[i + 1];
11       }
12       Arr[ArraySize - 1] = val;
13   }
14
15   void main()
16   {
17       int Arr[] = { 1, 2, 3, 4, 5, 6 };
18       int index, val;
19       cout << "Enter Index" << endl;
20       cin >> index;
21       cout << "Enter Value" << endl;
22       cin >> val;
23       function1(Arr, index, val);
24       cout << "Values of Array " << endl;
25       for (int i = 0; i < ArraySize; i++)
26       {
27           cout << Arr[i] << " ";
28       }
29   }
```

If the input of the program is
Enter Index: 4
Enter Value: 10

The output will be:

    A. 1 2 3 4 5 10
    B. 1 2 3 4 10 6
    C. 1 2 3 4 6 10
    D. None of the above

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Question 5:

```cpp
#include<iostream>
using namespace std;
int main()
{
    int n1 = 0, n2 = 1, n3, i, number = 15;
    cout << n1 << " " << n2 << " ";
    for (i = 2; i < number; ++i)
    {
        n3 = n1 + n2;
        n1 = 2 * n2;
        n2 = n3;
        cout << n3 << " ";
    }
}
```

 Identify the line that should be corrected to make the below code outputs the following series:
0 1 1 2 3 5 8 13 21 34 55 89 144 233 377

A. Line 6
B. Line 8
C. Line 9
D. Line 10

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Question 6:

```cpp
1    #include<iostream>
2    using namespace std;
3    int main()
4    {
5        int n, i, m = 0, flag = 0;
6
7        cout << "Enter the Number to check Prime: ";
8        cin >> n;
9        m = n / 2;
10       for (i = 2; i <= m; i++)
11       {
12
13           if (n % i == 0)
14           {
15               cout << "Number is not prime!\n";
16               |
17               break;
18           }
19       }
20       if (!flag)
21       {
22           cout << "Number is prime\n";
23
24       }
25   }
```

There is a missing line in this code, identify the line number to make it work as expected:

Enter the Number to check Prime: 17

Number is Prime

Enter the Number to check Prime: 57

Number is not Prime

A. Line 6

B. Line 12

C. Line 16

D. Line 23

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Question 7:

```cpp
1    #include<iostream>
2    using namespace std;
3    double div_function(double x, double y)
4    {
5        double result = x / y;
6
7        return result;
8    }
9    int add_function(int n)
10   {
11       int i, j = 0;
12
13       for (i = 0; i < n; i++)
14           j += 2;
15
16       test_function(j);
17
18       return j;
19   }
20   bool test_function(int test_var)
21   {
22       if (test_var == 0)
23           return 1;
24       else
25           return 0;
26   }
27   int main()
28   {
29       int a, b;
30       double c, d;
31       cout << add_function(a);
32       cout << test_function(b);
33       cout << div_function(c, d);
34       return 0;
35   }
```

How will functions execute from the start to the end of the run (after Main() executes)?

    A. add_function, test_function, div_function
    B. Syntax error, the program won't run.
    C. add_function, test_function, test_function, div_function
    D. div_function, add_function, test_function

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Question 8:

Which of the four function definitions perform overloading incorrectly?

A. void calculate_score(int score1, int score2);
   void calculate_score(double score1, double score2);

B. void calculate_score(int score1, int score2);
   void calculate_score(int score1, int score2, int score3, int score4);

C. void calculate_score(int score1, int score2);
   void calculate_score(double score1, int score2, double score3);

D. void calculate_score(int score1, int score2);
   int calculate_score(int score1, int score2);

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Question 9:

```cpp
1    #include<iostream>
2    using namespace std;
3
4    bool isSquare(int);
5
6    int main()
7    {
8        int max;
9        cin >> max;
10       for (int i = 0; i <= max; i++)
11           if (isSquare(i))
12               cout << i << " is square.\n";
13           else
14               cout << i << " is not square.\n";
15       return 0;
16   }
17
18   bool isSquare(int n)
19   {
20       int i = 0;
21       while (i * i < n)
22       {
23           i++;
24       }
25       if (i == n)
26           return true;
27       else
28           return false;
29   }
```

This code should print whether each of the numbers in the range [0, max] represent a square number or not.
Choose the most appropriate answer after tracing the code.

A. The code is correct.
B. The IF-ELSE conditions in main() are not correct.
C. The WHILE condition in isSquare(.) is not correct.
D. The IF-ELSE conditions in isSquare(.) are not correct.

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Question 10:

```cpp
1   #include <iostream>
2   using namespace std;
3
4   int function_name(float a[], int n, int x);
5
6   int main()
7   {
8       float a[50];
9       int n;
10      cin >> n;
11
12      for (int i = 0; i < n; i++)
13          cin >> a[i];
14
15      int x;
16      cin >> x;
17      cout << function_name(a, n, x) << endl;
18  }
19
20  int function_name(float a[], int n, int x)
21  {
22      int tmp = 0;
23      for (int i = 0; i < n; i++)
24          if (a[i] == x)
25              tmp++;
26
27      return tmp;
28  }
```

What does this code do?

A. Counts the number of elements in an array.
B. Prints the indexes in the array where the number 50 exists.
C. Counts the number of times a certain number exists in the array.
D. Prints the number of times every number exists in the array.