



# **COS1511**

October/November 2020

## **Introduction to Programming I**

Duration : 2 Hours

100 Marks

**EXAMINERS :**

FIRST :

MS P MVELASE

SECOND :

DR MA SCHOEMAN

---

Use of a non-programmable pocket calculator is permissible.

Closed book examination.

This examination question paper remains the property of the University of South Africa and may not be removed from the examination venue.

This paper consists of 10 pages.

### **INSTRUCTIONS:**

1. Answer all the questions in a Word document and convert it to PDF before submission.
2. Number your answers clearly.
3. In Questions 2 to 7 marks are awarded for part of an answer, so do whatever you are able to in each question.

**ALL THE BEST!**

**QUESTION 1 (10 MULTIPLE CHOICE QUESTIONS, 2 marks each)****(20)**

*Choose the correct answer and only write the number for the correct answer.*

**Question 1 (a)****1 (b)****1 (c)****etc.****QUESTION 1(a)**

What is the value of x after the following statements?

```
int x, y, z;  
y = 10;  
z = 3;  
x = y * z - 3;
```

1. 0
2. 3
3. 10
4. 27

**QUESTION 1(b)**

What is the value of x after the following statements?

```
int x;  
x = 0;  
x = x * 13;
```

1. 0
2. 13
3. 34
4. not defined

**QUESTION 1(c)**

3. What is the output of the following code?

```
int value;  
value = 11.5;  
cout << value << endl;
```

1. 11.5
2. 11
3. value
4. not defined

**QUESTION 1(d)**

What is the output of the following code?

```
cout << "Where is the \\" << endl;
```

1. Where is the \
2. Where is the
3. Nothing, it is a syntax error
4. Where is the \ endl

**QUESTION 1(e)**

What is the value of x after the following statements?

```
int x;  
x = 19 % 5;
```

1. 4.0
2. 4
3. 3.8
4. 8

**QUESTION 1(f)**

Which C++ statements correctly declare a variable called age, and prompt a user for his/her age.

1. 

```
int age = 0;  
cout << "Please enter your age: ";  
cin >> age;
```
2. 

```
int ages = 0;  
cout << "Please enter your age: ;  
cin >> age;
```
3. 

```
int age = 0;  
cout << "Please enter your age: ";  
cin >> ages;
```
4. 

```
int ages = 0;  
cout >> "Please enter your age: ";  
cin << age;
```

**QUESTION 1(g)**

Which C++ statement is the equivalent of the following statement using a single arithmetic assignment operator?

```
sum = sum + 12;
```

1. `sum == 12;`
2. `sum +12;`
3. `sum += 12;`
4. `sum += sum;`

**QUESTION 1(h)**

What is the value of x after the following statements?

```
float x;  
x = 0.0;  
x += 4.0 * 4.0;  
x -= 2.0;
```

1. 22.0
2. 12.0
3. 10.0
4. 14.0

**QUESTION 1(i)**

Given the array declaration below, what is stored in `numbers[2]` ?

```
int numbers[5] = {0};
```

1. 0
2. 1
3. 2
4. 3

**QUESTION 1(j)**

Given the array declaration below, which assignment statement will place the number 5 into the fifth array element?

```
int numbers[5] = {0};
```

1. `numbers[4] = 5;`
2. `numbers[5] = 5;`
3. `numbers[2+1] = 5;`
4. `numbers[1+4] = 5;`

**QUESTION 2****[12]**

Parents of the pupils of the Park Primary School must pay an amount for outfits for the annual play. All pupils take part in the play, except the Grade 0 pupils. The amount that the parents have to pay is calculated as follows:

- The cost of the outfits for Grade 1 and 2 pupils is R45.
- The cost of the outfits for Grades 3 to 5 is R65.
- Grade 6 and 7 pupils may play one or two roles. If they play a lead role, they may only play one role. The cost of the outfits is R70 if they play one role. If this role is a lead role, the cost is R100. If they play two roles, the cost is R130.

**Use a switch statement** and write down **ONLY the necessary C++ statements** to calculate and display the amount to be paid or display an appropriate error message if required.

Do NOT write a complete program. Use the following variables:

```
int grade;  
int fee;  
bool leadrole; //true if a child plays a lead role  
bool roles2;   //true if a child plays 2 roles
```

Assume that values have been assigned to these variables already.

**QUESTION 3****[10]**

A construction company pays its temporary workers R100 per day if they work on a Monday to Saturday and R200 if they work on a Sunday. They only work when the company contacts them, so they do not work the whole month. Complete the program below that asks the user to enter the days that the worker has worked. The character '1' is entered if the day is Monday to Saturday and '2' if it is a Sunday. A total is also updated to count the number of Sundays that was worked. The program must then calculate the total amount that the worker must be paid at the end of the month. When all days have been entered, the character 'x' is entered to terminate the loop. Use an appropriate loop structure.

Do not introduce any additional variables. Write down **ONLY** the missing statements.

```

#include <iostream>
using namespace std;
int main()
{
    const float SUNDAY = 200;           //salary per day for Sundays
    const float OTHER = 100;           //salary per day for other days
    char whichDay;                      //'2' for Sundays, '1' for
                                        //other days
    float totalAmount;                 //total salary
    int nrSundays;                     //number of Sundays worked

    cout << "Enter first day:'2' for Sunday, '1' for other days" << endl;

    // YOUR STATEMENTS SHOULD COME IN HERE

    cout << "Total salary:" << totalAmount << endl;
    cout << "number of Sundays worked:" << nrSundays << endl;

    return 0;
}

```

**QUESTION 4****[13]**

In this question you have to write a complete function

MyMedia Publishers uses two parallel arrays to keep track of the number of subscriptions for each of their 50 publications. Array `publications` holds the names of the magazines and newspapers published and array `subscriptions` holds the number of subscriptions for each corresponding magazine or newspaper. You have to write a void function, called `findMostSubs` to determine which publication has the most subscribers. Function `findMostSubs` has to return the name of the publication as well as the number of subscribers to that publication.

Assume the following:

- A declaration of a global constant

```
const int NUM_PUBS = 50;           //number of publications
```

- four declaration statements in the main function

```

string publications[NUM_PUBS];    //titles of the publications
int subscriptions[NUM_PUBS];      //number of subscriptions for the
                                //corresponding publications
int nrMostSubscriptions;          //number of subscriptions for
                                //publication with most subscriptions
string mostSubscriptions;         //title of publication with
                                // most subscriptions

```

TURN OVER

- values have been assigned already to all the elements of the arrays
- the function is called in the main program as follows

```
findMostSubs(publications,subscriptions,mostSubscriptions,
             rMostSubscriptions );
```

Write down ONLY the complete function `findMostSubs`.

### QUESTION 5

[16]

- (a) Declare two integer constants `ROWSIZE` equal to 4 and `COLSIZE` equal to 4. (4)
- (b) Declare two `int` two-dimensional arrays, namely (4)
- `play1` with `ROWSIZE` number of rows and `COLSIZE` number of columns, and
  - `play2` with `ROWSIZE` number of rows and `COLSIZE` number of columns,
- (c) Assume that values have been assigned to all the elements of `play1` and `play2`. Also assume that an `int` variable `tricky` has been declared and initialised to 0. Use nested `for` loops and write down the necessary C++ statements to do the following:
- Each row of `play1` is compared element by element to the corresponding row of `play2`.
  - If the elements are equal, add the value of one element to `tricky`.
  - If the elements are not equal, add the sum of the two elements to the value of `tricky`.

For example, if `play1` and `play2` are initialised as follows:

1	5	3	7		4	6	3	7
6	8	5	8	and	5	0	7	8
3	3	3	5		8	7	6	5
7	8	1	5		7	3	4	5

respectively, then the value of `tricky` will be:

$5+11+3+7+11+8+12+8+11+10+9+5+7+11+5+5=128$

Display the value of `tricky`. Do NOT write a complete program or any functions. Write down ONLY the required statements. (8)

**QUESTION 6****[14]**

A sanitary ware shop keeps the following information for the items in stock:

- description (a string, for example "bath")
- code to distinguish between items with the same description and colour but of a different design (a string to store 6 digits, for example "123456")
- colour (a string, for example "white")
- number in stock (an integer, for example 49)
- price (a floating point number, e.g. 349.95)

(a) Write down the declaration for a `struct` for storing the information associated with one kind of item in stock. Give the name `Item` to the `struct`. (6)

(b) Assume that an array  
`Item stock[50]`

has been declared and that information for 50 items in stock has been stored in the array. The program fragment below prints the codes for all the white baths and determines the total number of white baths in stock. Now write down ONLY the necessary C++ instructions for line numbers 2, 4, 6, 8, 9 and 11 to complete this program fragment. Write down only the line number and the instruction that should appear next to the line number. (8)

```
1. int total;

2. //initialise total

3. //search through array to find all white baths
4. for ( ) //examine all items
5. {
6. //test if item is a white bath
7. {
8. //print codes for white baths
9. //update the total number of white baths in stock
10. }
11. //display total number of white baths in stock
```



**QUESTION 7****[15]**

In this question you have to **write a C++ program** to convert a date from one format to another. You have to write a complete program consisting of a main() function and a function called convertDate().

The function receives a string of characters representing a date in American format, for example December 29,1953.

The function has to convert this date to the international format. For example, if the string

December 29,1953

is received, the string

29 December 1953

should be returned to the main function.

Use the following C++ skeleton:

```
#include <iostream>
#include <string>
using namespace std;

string convertDate(.....)
{
    // Add the code for the function here
}

int main()
{
    string americanDate;

    //Add the code for the main function here

return 0;
}
```

The main()function should prompt the user to enter the string, then read the string and call function convertDate() to convert it to the required form.

**Hint(1):** Below the question we list a number of string member functions you may need.

**Hint(2):** Start the convertDate()function by determining the position of the first space character in the input.

TURN OVER

**A number of string member functions to help you**

```
StringObject.size( )
```

```
StringObject.substr(startPos,length)
```

```
StringObject.find(substring)
```

```
StringObject.find(substring, startPos)
```

```
StringObject.insert(insertPos, substring);
```

```
StringObject.erase(startPos, length);
```

```
StringObject.replace(startPos, length, substring);
```

where

startPos, length and insertPos are of type int, and  
substring is of type string.