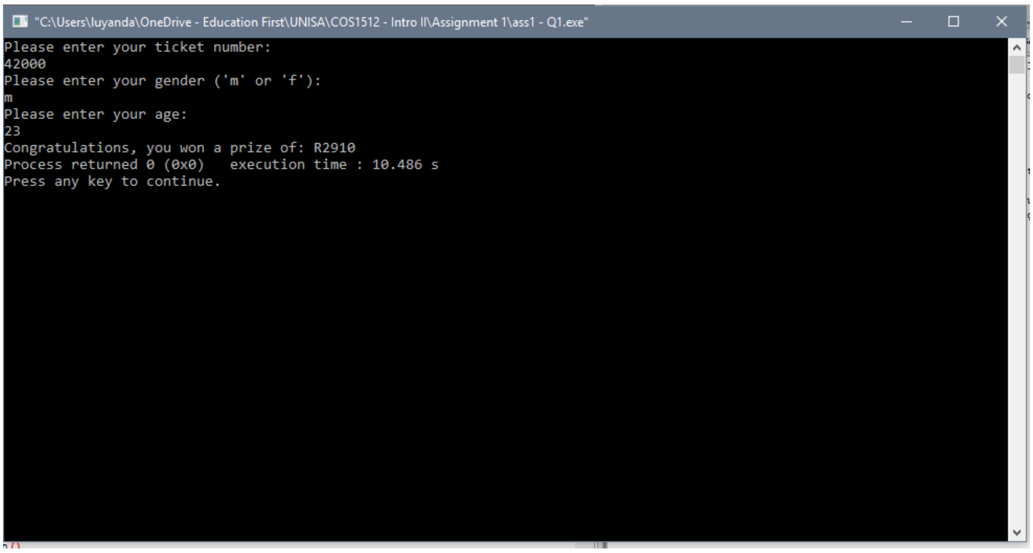
Luyanda Mncube 59448873 COS1511 Assignment 3

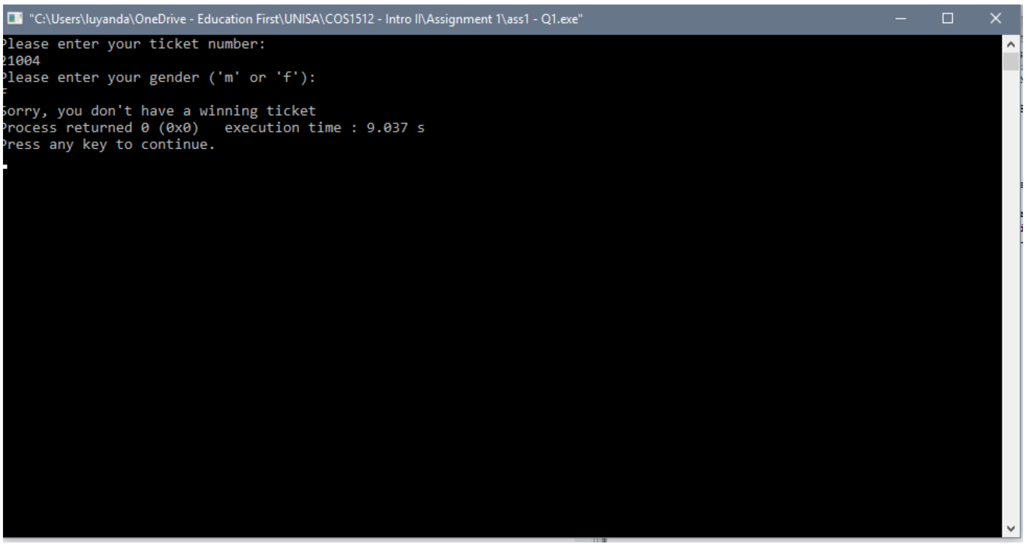
Question 1

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

void getprize(int ticketnum, char gender)
{
float prizemoney;
            if (gender == 'm' && ticketnum > 30000)
                  prizemoney = ticketnum/90;
            else
            if (gender == 'f' && ticketnum > 20000)
                  prizemoney = ticketnum/80;
      //output prize money
      cout << "Congratulations, you won a prize of: R" << prizemoney;
}

void getprize(int ticketnum, char gender, int age)
{
float prizemoney;
if (age <= 21 )
      prizemoney = age * 40;
else
if ( age > 21)
      prizemoney =  age * 30;
cout << "Congratulations, you won a prize of: R" << prizemoney;
      }

int main()
{
    int ticketnum, age;
    char gender;
//Input ticket number
cout << "Please enter your ticket number: \n";
cin >> ticketnum;

//Input gender
cout << "Please enter your gender ('m' or 'f'):  \n";
cin >> gender;

//check divisible by 6  AND 7
      if (ticketnum % 6 == 0 && ticketnum % 7 == 0)
      {
            cout << "Please enter your age: \n" ;
            cin >> ticketnum;
            getprize(ticketnum,gender,age);
      }
      else
//Check divisible by 100
    if (ticketnum % 100 == 0)
       getprize(ticketnum,gender);

else
cout << "Sorry, you don't have a winning ticket" ;

return 0;

}
```


"C:\Users\luyanda\OneDrive - Education First\UNISA\COS1512 - Intro II\Assignment 1\ass1 - Q1.exe"

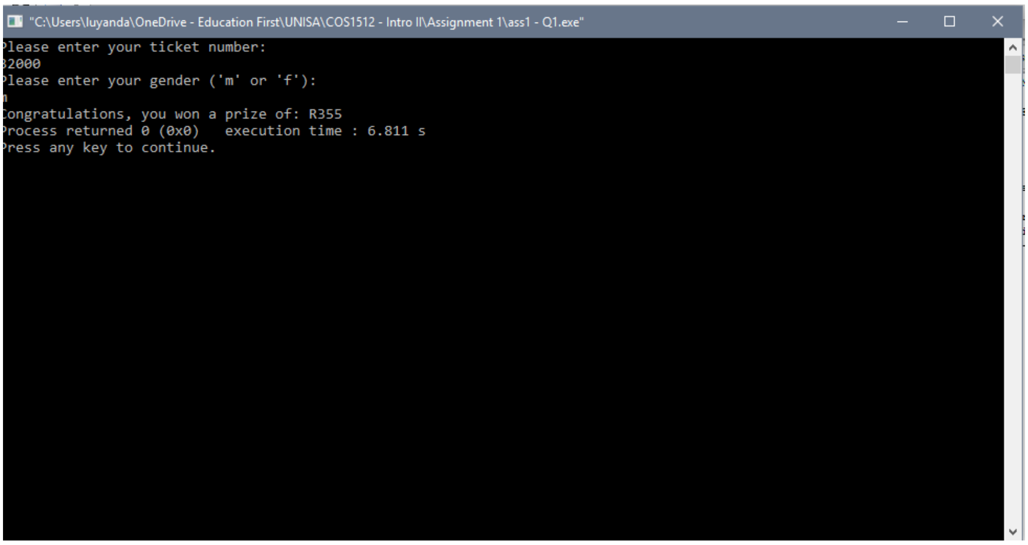
```
Please enter your ticket number:
42000
Please enter your gender ('m' or 'f'):
m
Please enter your age:
23
Congratulations, you won a prize of: R2910
Process returned 0 (0x0)   execution time : 10.486 s
Press any key to continue.
```

Tested with input of 42000, a number divisible by 6 and 7 and by 100 (6*7*1000)


"C:\Users\luyanda\OneDrive - Education First\UNISA\COS1512 - Intro II\Assignment 1\ass1 - Q1.exe"

```
Please enter your ticket number:
21004
Please enter your gender ('m' or 'f'):
f
Sorry, you don't have a winning ticket
Process returned 0 (0x0)   execution time : 9.037 s
Press any key to continue.
```

Tested with 21004, not divisible by 100 so not a winning ticket

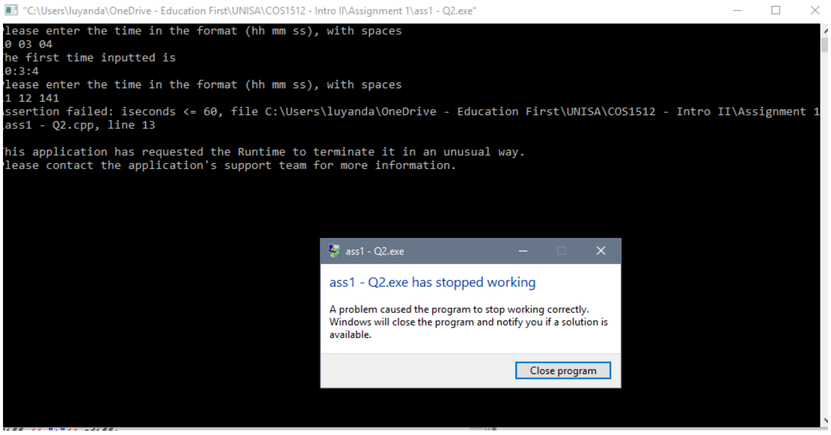

"C:\Users\luyanda\OneDrive - Education First\UNISA\COS1512 - Intro II\Assignment 1\ass1 - Q1.exe"

```
Please enter your ticket number:
32000
Please enter your gender ('m' or 'f'):
m
Congratulations, you won a prize of: R355
Process returned 0 (0x0)   execution time : 6.811 s
Press any key to continue.
```

Tested with 32000, divisible by 100 and anormal winning ticket

Question 2

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

void inputtime(int& itotal, int& iminutes, int& iseconds, int& ihours)
{
cout << "Please enter the time in the format (hh mm ss), with spaces \n";
cin >>ihours >> iminutes >> iseconds;

//assert macro
assert (iseconds <= 60);
assert(iminutes <= 60);
assert(ihours <= 24) ;

//Convert time to seconds
itotal = (ihours * 3600) + (iminutes * 60) + iseconds;

}

int main()
{
int imax = 0 , idifference = 0, itime2, sdiff, mdiff, hdiff,
itime1,iminutes,iseconds,ihours;
//Input and display first time
inputtime(itime1,iminutes,iseconds,ihours);
cout << "The first time inputted is \n" << ihours <<
":"<< iminutes << ":"<< iseconds;
cout << endl;

//Input and display second time
inputtime(itime2,iminutes,iseconds,ihours);
cout << "The second time inputted is  \n" << ihours <<
":"<< iminutes << ":"<< iseconds;
cout << endl;

//Check which time is smaller
if (itime1 > itime2)
{
      imax = itime1;
      idifference = itime1 - itime2;
      cout << "The first time entered is larger  \n";
    cout << endl;
}

else
{
      imax = itime2;
      idifference = itime2 - itime1;
      cout << "The second time entered is larger \n";
      cout << endl;
}
//Get time difference
mdiff = idifference / 60;
sdiff = idifference % 60;
hdiff = mdiff / 60;

cout << "The time difference is " << hdiff <<
":"<< mdiff << ":"<< sdiff;
return 0;
}
```



"C:\Users\luyanda\OneDrive - Education First\UNISA\COS1512 - Intro II\Assignment 1\ass1 - Q2.exe"

```
lease enter the time in the format (hh mm ss), with spaces
0 03 04
he first time inputted is
0:3:4
lease enter the time in the format (hh mm ss), with spaces
1 12 141
ssertion failed: iseconds <= 60, file C:\Users\luyanda\OneDrive - Education First\UNISA\COS1512 - Intro II\Assignment 1
ass1 - Q2.cpp, line 13

his application has requested the Runtime to terminate it in an unusual way.
lease contact the application's support team for more information.
```

ass1 - Q2.exe

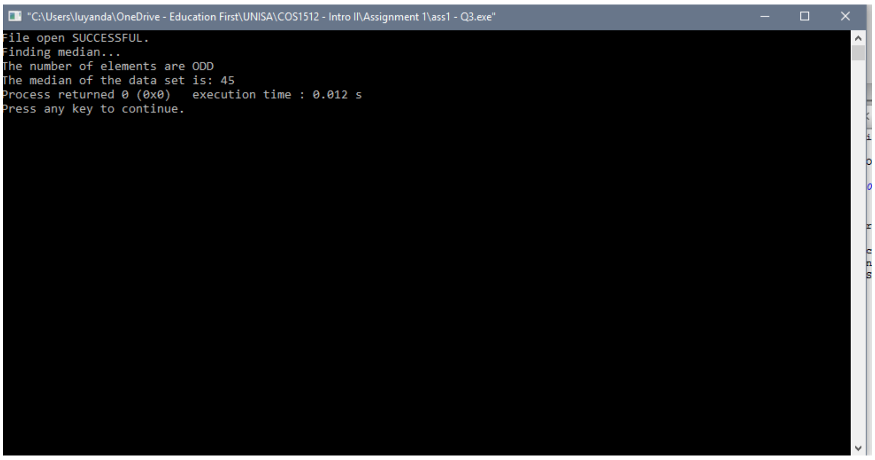
ass1 - Q2.exe has stopped working

A problem caused the program to stop working correctly. Windows will close the program and notify you if a solution is available.

Assertion test

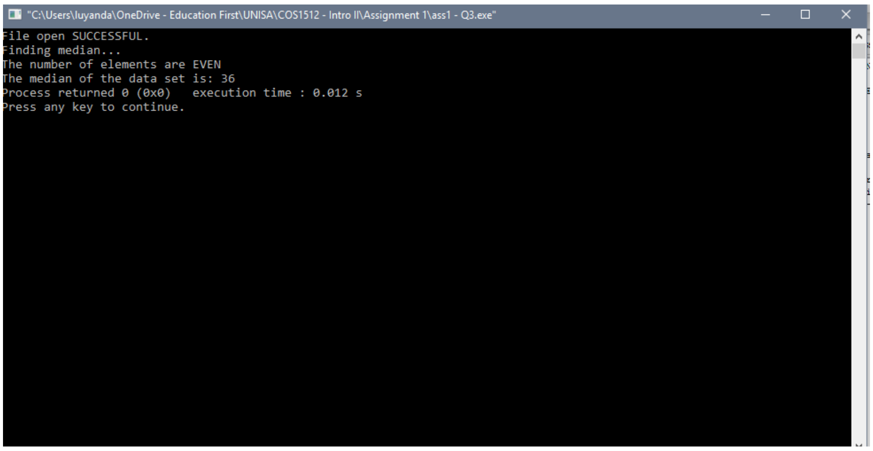
Question 3

```
#include <cstdlib>
#include <iostream>
#include <fstream>
using namespace std;
int main()
{
double p[20], r;
int numElements = 0;
int medElement, middlepoint;
ifstream in_stream;
in_stream.open("file1.txt");
if(in_stream.fail())
{
cout << "Failed to open a file" << endl;
system("PAUSE");
exit(0);
}
else
{
cout << "File open SUCCESSFUL. \n";
//Loop to count number of elements in text file
while(!in_stream.eof())
{
in_stream >> p[numElements];
numElements = numElements + 1;
}
}
in_stream.close();

cout <<"Finding median... \n";
//If number of elements are EVEN
if (numElements%2 == 0)
{
    cout << "The number of elements are EVEN \n";
    middlepoint = numElements/2;
    medElement = (p[middlepoint] + p[middlepoint+1])/2;
}
//If number of elements are ODD
else
{
    cout << "The number of elements are ODD \n";
    middlepoint = (numElements/2) + 1;
    medElement = p[middlepoint];
}

cout << "The median of the data set is: " << medElement;
return 0;
}
```


"C:\Users\luyanda\OneDrive - Education First\UNISA\COS1512 - Intro II\Assignment 1\ass1 - Q3.exe"

```
File open SUCCESSFUL.
Finding median...
The number of elements are ODD
The median of the data set is: 45
Process returned 0 (0x0)   execution time : 0.012 s
Press any key to continue.
```

Test with first set of numbers


"C:\Users\luyanda\OneDrive - Education First\UNISA\COS1512 - Intro II\Assignment 1\ass1 - Q3.exe"

```
File open SUCCESSFUL.
Finding median...
The number of elements are EVEN
The median of the data set is: 36
Process returned 0 (0x0)   execution time : 0.012 s
Press any key to continue.
```

Test with second set of numbers

Question 4 (Incomplete)

```
#include <iostream>
#include <fstream>
#include <cstdlib>
using namespace std;

//create type definition pointer for dynamic array
typedef int* p;

void encryptordecrypt (char file_Read[16], char file_Write[16], int option)
{

ifstream readtextfile;
int num_characters=0, i=0;
char next;

//open input file stream
readtextfile.open(file_READ);

//loop to count number of characters
while(!readtextfile.eof())
{
cout << ch;
infile.get(ch);
num_characters = num_characters + 1;
}

//Create dynamic array p with numElements
charArrptr p;
charArrptr q;
p = new char [num_characters];
q = new char [num_characters];      //array to hold encryted characters

//loop to input characters from file into char array
in_stream >> p[0];
while (! readtextfile.eof( ))
{
toupper(readtextfile.get(p[i])); //upper & lowercase letters

//encryption algorithm
if (option == 1)
{
      if (p[i] == 'Z')
      q[i] = 'A';
      else
      q[i] = p[i+1];
      // cout ???? how to place into array/file
      i++;
}

//decryption algorithm
else if (option == 2)
{
      if (p[i] == 'A')
      q[i] = 'Z';
      else
      q[i] = p[i-1];
      // cout ???? how to place into array/file
      i++;

}
}
}
int main()
{
int option;
char file_name1[16], file_name2[16];

//declare input & output streams
ifstream readtextfile;
ofstream writetextfile;

//Output user instructions into console
cout<<"Enter Your Option ";
cout<<"1. To Encrypt The File \n";
cout<<"2. To Decrypt The File ";
cout<<"Option : ";
cin>>option;

//Create file for encrypt or decrypt
cout << "Enter the file name to read/ write FROM (maximum of 15
characters):\n";
cin >> file_READ;

cout << "Enter the file name to read/ write TO (maximum of 15
characters):\n";
cin >> file_WRITE;

if(option == 1)
{
cout << "File name for READ is: " << file_READ << endl;


//error check input stream
      if(readtextfile.fail() = 0)
      {
      cout << "Failed to open read/input stream";
      exit(1);
      }
//Call encryptordecrypt function

}
else if (option == 2)
{
cout << "File name for decryption is: " << file_name << endl;
//open output stream
writetextfile.open(file_name);
//error check input stream
      if(writetextfile.fail() = 0)
      {
      cout << "Failed to open write/output stream";
      exit(1);
      }
//Call decrypt option
encryptordecrypt (file_READ[16],fileWRITE[16], option);
}
else
cout << "Please select valid option!";
return 0;
}
```

Question 5 (incomplete)

(a) A pointer holds is the address in memory of a variable. A pointer itself is not a number but rather an area in memory which references a variable.

(b) A dereferencing operator (*) is used to dereferences a pointer. It is used with the abovementioned pointer to show the value of the variable the pointer is pointing to

(c) p1 = p2, we are assigning the right hand side **pointer** to the left hand pointer using memory addresses.
In *p1 = *p2 we are assigning the **value** inside the right hand side variable to the left hand variable.

(d) A dynamic variable is a variable that is created while a program is running. It is different from other variables which are allocated memory during compile time in general memory whereas dynamic are only allocated memory in the freestore during execution of a program.

(e) New operator instantiates a new, nameless variable, with a specified data type. This is used to create dynamic variables as it actually holds a pointer and can only be accessed by referring to the pointer which the operator instantiates.

(f) Delete is used so that a dynamic variable created will no longer take up the memory it was allocated in the freestore.

(g) Freestore is a limited, designated area in memory that is reserved specifically for to be used for dynamic variables.

(h) A dynamic variable is a variable that is created while a program is running . They have a reserved space in memory, and they are created and destroyed while the program is running.

Automatic variables are created when a function in which they are declared is called and are automatically destroyed when the function ends.

(i) A dynamic array is one where the size is not specified when it is created. The size is only specified during runtime so hypothetically it could be of any size specified by the program (unlike in the case of normal arrays which have a set size specified at run time)

(j) Dynamic arrays are useful as the size of the array can be changed or specified during the program execution. A user could for instance, input the size desired and change the size of the array during execution

(k) Arrays and pointers are almost identical. An array declared as int a[10] is declaring a pointer to the first element in an array. In this sense, “a” is the pointer. The only difference between arrays and pointers is that “a” would be a constant in an array.

(l)

```
salary = 4500.00,  increase = 475.00 double
```

vi. p1 = &a;
vii. delete p1;

(m)