# CS 10061 Sample Final Exam

**Name_____**

**Multiple Choice. Circle the correct answer (4 points each).**

1. What is the effect of the following code fragment?

```
int num1 = 3;
int num2;
cin >> num2;

if ( num2 / num1 == 1 )
       cout << "first option" << endl;
else
       cout << "second option" << endl;
```

   a) display first option if num2 is divisible by 3, and the second option if num2 is not divisible by 3.
   b) displays `first option` if `num1` and `num2` are equal to `1`, and `second option` otherwise
   c) displays `first option` if the number 3,4, or 5 are entered as input, and `second option` if any other integer is entered as input
   d) displays `first option` if `num1` and `num2` are equal and `second option` otherwise

2. What is the output of the following code fragment if the input values are 1 and 2 respectively?

```
int  x;
int  y;
cin >> x;
cin >> y;
cout << y;
cout << x << endl;
```

   a) 1
      2
   b) 2 1
   c) 2
      1
   d) 21

3. Which of the following directives must be included in a program in order to use C++ facilities for file input and output?

   a) `#include <filestream>`

b) `#include <fiostream>`
c) `#include <fstream>`
d) `#include <iofstream>`

4. Which is the correct C++ condition to check whether the value of integer `x` is between `5` and `9` (inclusive) ?

a) `5 <= x <= 9`
b) `5 < x < 10`
c) `5 <= x && x <= 9`
d) `5 <= x || x <= 9`

5. What is displayed by the C++ statements that follow if the value input is 0?

```
cin >> color;
if ((color == 0) && (color == 1))
       cout << "red ";
else if (color > 0) && (color < 2)
       cout << "blue ";
else if (color <3)
       cout << "green ";
else
       cout << "yellow ";
cout << endl;
```

a) blue
b) green
c) yellow
d) `red blue green yellow`

6. The value of the expression below is _____ if
int `a` = 2, `b` = 4, `c` = 8;

```
(a / b)*c
```

a) 0
b) 1
c) 2
d) 4

Questions 7–10 refer to the following program fragment. Assume that all variables are of type `int` and that `y` and `z` are initialized to 0.

```
int i =1;
    while  (i < 10) {
   cin >> x;
   y = y * x;
   if ( x % 3 == 0 )
          z=z+1;
   i=i+1;
}
```

7. How many times is the loop body of the `for` statement executed?
   a) Once
   b) 9 times
   c) 10 times
   d) until a number larger than 10 is entered

8. Which variable is the loop control variable?
   a) i
   b) x
   c) y
   d) z

9. The value of variable `y` at loop exit could best be described as
   a) the sum of the values entered
   b) the number of values entered
   c) the product of the values entered
   d) 0

10. The value of `z` at loop exit could best be described as
   a) the percentage of `x` multiplied by 2
   b) the number of integers entered that are multiples of 3
   c) the number of times 3 is entered
   d) the number of time a number greater than 3 is entered.

11. You are designing a loop that is to exit only if the values of both `x` and `y` are 1 and 2 respectively. Which of the following would you use for your loop repetition condition?
   a) `x != 2 && y != 1`
   b) `x == 1  && y = 2`
   c) `(x != 1) || (y != 2)`
   d) `(x != 1) && (y != 2)`

12. What is the error in the line

int a=product ( 6, 5 );

Definition of sum:

```
int product( int& num1, int num2 )
{  int num3;
       num3=num1; num1=num2;
       return( num3 * num2 );
}
```

a) A function cannot be used to initialize a value
b) The first parameter should be a variable
c) The second parameter should be a variable
d) Both parameters should be variables

13. What is the output from this program?

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

void doSomething ( int&, int& );

int main ()
{
       int    first;
       int    second;
       first = 1;
       second = 2;
       doSomething( first, second );
       cout << first  << " " << second << endl;
       return 0;
}

void doSomething( int& this, int& that )
{
       int theOther;

       theOther = 5;
       that = 2 + theOther;
       this = theOther * that;
}
```

a) 35 2
b) 7 35
c) 35 7
d) 1 2

14. What is the output from this program?

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

double doSomething ( double, int );

int main ()
{
       double A;
       int B;
        double C;
       A = 1;
       B = 2;
       C=doSomething( A, B );
       cout << A << B <<C <<endl;
       return 0;
}

double doSomething( double B, int A )
{
       int C;

        C=A+1;
        B =C/A + B;
        return B;
 }
```

a) 2.012.0
b) 1.022.5
c) 2.012.5
d) 122

15. What is the value returned by funA(2.1,3.1) if

```
int funA(float x, float y){
    int a,b;
    a=x+1;b=y-1;
   return funB(a,b);
}
int funB(int x, int y){
    return (x%y +x/y);
}
```

a) 1
b) 2
c) 3
d) 4

**Answer the following in the space provided. Use the back of the test if necessary (8 points each)**

1. Given the following environment:

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

int main()
{
       int    num1;
       double num2;
        char c;
       ...
```

Write a code fragment that displays a message telling the user what type of data to enter, copies into the variables `num1, num2, and c` the values entered by the user, and then echoes (prints) their values to the screen.

```
cout << "Enter an integer and type return" << endl;
cin >> num1;
cout << "num1 = " << num1;
cout << "Enter a floating point number and type return" << endl;
cin >> num2;
cout << "num1 = " << num2;
cout << "Enter a character and type return" << endl;
cin >> c;
cout << "c = " << c;
```

2. Write an expression to represent the following condition:

`digit` is strictly between (i.e. not equal to) 9 and -1.

```
(digit > -1) && (digit < 9)
```

3. Write a program fragment to extract numbers from the keyboard, compute the sum of the odd numbers entered, and display the result. Use the integer 0 as a sentinel.

```
cout << "Enter the list of numbers, enter a 0 to terminate input" << endl;
int num=1,sum=0;
while (num !=0){
    cin >> num
    if (num % 2 == 1) sum = sum +num;
}
cout << " The sum of the odd numbers entered is " << sum << endl;
```

4. Write a program fragment that uses nested loops to display the following lines

```
 1  2  4  6 ...100
 2  3  5  7 ...101
 3  4  6  8 ...102
 4  5  7  9 ...103
 .  .  .  .     .
 .  .  .  .     .
 .  .  .  .     .
10 11 13 15    109
```

```
for (i=1; i<11; i++){
   cout << i;
   for (j=i+1; j<100+i; j=j+2){
      cout << " " << j;
   }
   cout << endl;
}
```

5. Define a function named `divr` that take two integers x and y and returns x%y and x/y. For instance, given the number numbers 9 and 4, `divr` would return the values 2 and 1. Function `divr` has two type `integer` input parameter and two integer output parameters.

```
void function(int x, int y, int& quotient, int& remainder){
   quotient=x/y;
   remainder=x % y;
   return;
}
```

**Part II. Each question is worth 20 points.**

1. Write a code fragment to
   a) Ask the user to enter the number of integer test scores to be read in
   b) Ask the use to enter the test scores
   c) compute and output the average and standard deviation.

   The standard deviation is define as sqrt(ssq/n)
   ssq=(scores[0]-avg)^2+(scores[1]-avg)^2+...(scores[n-1]-avg)^2

Declare all the variable you used.

```
int n,i;
cout << "Enter the number students taking the test" <<endl;
cin >> n;

int scores[n];
double avg=0;
for (i=0;i<n;i++) {
   cin >> scores[i];
   avg += scores[i];
}

avg=avg/n;
cout << "The test average is ";
cout << avg << endl;
double std=0;
for (i=0;i<n;i++){
  std += (scores[i]-avg)*(scores[i]-avg);
}

cout << "The standard deviation is ";
cout << sqrt(std/n) <<endl;
```

2. Write a code fragment to print out the array of characters defined by
   char tble[30][15] ;
   in a table with 30 rows and 15 columns with one space between each character in a row.

```
for (i =0; i< 30;i++){
   for (j=0; j<15; j++)
        cout << tble[i][j] <<" ";
    cout << endl;
}
```

3. Write a function to print out a triangle with n lines that looks like this

```
o o o o o
 o o o o
  o o o
   o o
    o
```

```
void pretty_triangleDwn(int n){
int line_count=1;
 while (line_count <= n ){
  int spaces=1;
  while (spaces<line_count){ //print out spaces
   cout << " ";
     spaces=spaces+1;
   }
   int letters=n-line_count+1;
   while (letters >0 ){  //print out o's
     cout << "o ";
     letters=letters-1;
   }
   cout << endl;
   line_count=line_count+1;
  }

}
```

4. An image is stored in an array defined by
   char pic[256][256][3];
   Write a code fragment to color each pixel red.

```
for (i=0; i<256;i++)
    for (j=0;j<256;j++){
     pic[i][j][0]=255;
     pic[i][j][1]=0;
     pic[i][j][2]=0;
}
```

5. An image is stored in an array defined by
char pic[256][256][3];
Write a code fragment to produce an 8x8 checkerboard with blue and red squares.

```
int blockrow;blockcol;
for (i=0; i<256;i++){
    blockrow=(i/32);
    for (j=0;j<256;j++){
       blockcol=j/32;
       if ((blockrow+blockcol)%2 ==0){
         pic[i][j][0]=255;
         pic[i][j][1]=0;
         pic[i][j][2]=0;
       }
       else {
         pic[i][j][0]=0;
         pic[i][j][1]=0;
         pic[i][j][2]=255;
       }
   }
}
```