Name: _____ Student ID: _____

Test #1 **CS 120**
Hasan Jamil September 23, 2016

Answer questions as indicated. Closed book/Closed Notes. NO PDAs (calculators, handheld, cell phones, etc.) allowed.

1 Basic Concepts—20 points

Circle the correct answer. If you are using pen and change your answer, write your answer to the right. All T/F problems are worth 2 points each.

Problem 1.	C++ is a compiled language.	True	False
Problem 2.	C++ is a subset of C.	True	False
Problem 3.	C++ is case sensitive.	True	False
Problem 4.	`if` is a valid variable name.	True	False
Problem 5.	`4_r` is a valid variable name.	True	False
Problem 6.	`e4R7h` is a valid variable name.	True	False
Problem 7.	Variables must be declared before they are used.	True	False
Problem 8.	Variables must be initialized before they can be used.	True	False
Problem 9.	`int x;` declares `x` to be a *real* variable.	True	False
Problem 10.	`double a;` declares `a` to be an *real* variable.	True	False

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2 Arithmetic Operations—20 points

Fill in the blank. What is the value of k in the following statements using *integer* arithmetic. Each problem in this section is worth 4 points.

Problem 11. `k = 4 % 5 * 8 - 6;` _____

Problem 12. `k = 5 / 3 + 2 * 2;` _____

Problem 13. `k = 4 % 5 * 2 / 7;` _____

Problem 14. `k = (3 / 2) > (5 / 4);` _____

Problem 15. `k = ('7' - '4') / (8 - 4);` _____

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3 Program Statements—15 points

Show any/all additional variable names and types that you choose to use.

Problem 16. (3 points) Write a C++ statement to convert x pounds to y kilograms (recall: 1 kg = 2.2 lb).

Problem 17. (4 points) Write a C++ statement to convert x miles/hour to y km/sec (recall: 1 mile = 1.609 km).

Problem 18. (4 points) Write a C++ statement that can be used to calculate the volume of a hollow sphere $V = \frac{4}{3}\pi(O^3 - I^3)$, where O is the outer radius and I is the inner radius.

Problem 19. (4 points) Write a C++ statement to calculate the gravitational force F between two celestial bodies with masses m_1 and m_2. Recall that the force is proportional to the product of the two masses and inversely proportional to the square of the distance between them:

$$F = G\frac{m_1 m_2}{r^2}$$

where, F is the force between the masses, G is the gravitational constant, m_1 is the first mass, m_2 is the second mass and r is the distance between the centers of the masses.

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4 Program Analysis—20 points

Fill in the blanks. Two points each. Problem 21 refers back to problem 20.

Problem 20. `double  r = 1.25;` declares that `r` is a _____ variable.

Problem 21. `cout << "j:  " << r*3.1;` will write: _____.

Problem 22. `char  c = 'R';` declares that `c` is a _____ variable.

Problem 23. `long  t = 4;` declares that `t` is a _____ variable.

Problem 24. `int z;  z = 2.3*3.17;`
`cout << "z:  " << 'z';` will write: _____.

Problem 25. There are at least **five** *syntax* errors in the program below, at most one per line. **Circle five** and only five of them. Each error is worth two points.

```
//  test1.cpp
#include <iostream>

use namespace std;

int Main()
{
    int     i, j;
    double  x, y;
       /*/*  read values   */*/
    cout << "Enter two numbers: ";
    cin  >> x, y;

    cout << "Enter two more numbers: ";
    cin  >> i, k;

    real    a = x * y;
    double  b = i + j;
    if (  a >= b );
        cout << "product is less than sum" << endl;
    else
        cout << "product is greater than sum" << endl;
    return 0;
}
```

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5 Programming—20 points

Problem 26 (**20 points**). Write a *complete* program that reads three (3) numbers and prints the average value and the largest number entered (read). Note: Arrays may not be used to solve this problem.

Part A (5 points): **Design** (Describe how your program will work):

Part B (5 points): **Test** (Describe how you will test your program):

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Part B (10 points): **Implement** (Write the program):

Bonus Problem: Two points. Write a code *fragment* that will convert a lower case letter to upper case.