Computer Science I **Name:** _____
Fall 2015, Prof. Bolton **Net ID:** _____
Midterm Exam

This exam contains 8 pages (including this cover page) and 24 questions. Total of points is 250.

Conditions: You are permitted writing utensils and the midterm. No other items are permitted, e.g. no notes, no text, ...

Note: The pages are double-sided. **PLEASE WRITE your name** on all pages! No questions during the test.

I, _____, understand the above statements and agree to follow these terms, and upon my honor, I swear that the answers provided are of my design and of my effort alone. I have not received nor viewed answers from any source but myself.
$< sign >$ _____

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1. (51 points) True or False

Statement	T or F
Comments are completely ignored by the compiler.	
Operands of arithmetic operators are never demoted	
Promotion and demotion are types of casts	
A variable is a name for a storage location in memory.	
Arrays are linear data structures.	
The $--$ operator can be used to decrement the value of a variable .	
The type of a variable can be changed by casting.	
void is a valid return type of a function.	
Functions can only have one return type.	
Functions can only have one parameter.	
Boolean variables can evaluate to only one of two values.	
Variables of type double generally have twice the memory of those of type float.	
Variable names can begin with a number (numeric character).	
Scope refers to the accessibility of variables.	
C++ implements static scope.	
Variables can never be accessed out of scope.	
Global variables are accessible anywhere in the file in which they are declared.	

MULTIPLE CHOICE. CIRCLE ONE ANSWER.

1. (4 points) A(n) _____ is a value that remains constant.
   A. comment
   B. literal
   C. variable
   D. references

2. (4 points) Which one of the following special character(s) indicates the beginning of a comment.
   A. //
   B. <>
   C. (
   D. {

3. (4 points) Which one of the following special character(s) marks the beginning of a preprocessor directive.
   A. //
   B. #
   C. (
   D. {

4. (4 points) Which one of the following special character(s) marks the beginning of a scope.
   A. //
   B. #
   C. (
   D. {

5. (4 points) A preprocessor directive is run _____ compilation.
   A. during
   B. before
   C. after

6. (4 points) Which of the following is a string literal.
   A. “string”
   B. string
   C. ’\n’
   D. var

7. (4 points) Which of the following is a char literal.
   A. “string”
   B. string
   C. ‘\t’
   D. !

8. (4 points) In many instances, a programmer might desire to manipulate a string literal using an escape sequence. Which of the following is an escape sequence.
   A. “string”
   B. string
   C. ‘\t’
   D. !

9. (4 points) Which of the following is the assignment operator.
   A. =
   B. <=
   C. ==
   D. -

10. (4 points) What is the data type of the following literal: 4
    A. string
    B. double
    C. char
    D. int

11. (4 points) What is the data type of the following literal: 5.5
    A. string
    B. double
    C. char
    D. int

12. (4 points) Differing data types of operands can be a concern when using operators with two operands. C++ will sometimes use _____ to resolve these issues.
    A. casting
    B. operator precedence
    C. relational operators
    D. static

13. (4 points) _____ is when c++ implicitly performs a cast.

    A. type coercion

    B. static cast

    C. promoting

    D. demoting

14. (4 points) When the following expression is evaluated, the result is a(n) _____ : 'c'/4+10 > 10

    A. int

    B. double

    C. bool

    D. char

    E. compilation error

15. (4 points) Which of the following operators has the highest precedence, that is, which is evaluated first.

    A. +

    B. *

    C. ||

    D. >

16. (4 points) What is the value of re *after* line 3 is executed.

    line 1: int num = 1;
    line 2: int result = num * 0.5;
    line 3: double re = result + 5.0;

    A. 5.5

    B. 6

    C. 5.0

    D. 6.5

17. (5 points) Given the following snippet of code, what is the output to the console when the main is executed?

```
line 1: void func(int n) {
line 2: int i = 1; n++;
line 3: cout << n << " " ;}
line 4:
line 5: int main() {
line 6: int n = 15; func(n); cout << n<<endl;
line 7: return 0;}
```

A. 16 15

B. 15 16

C. 16 16

D. 15 15

18. (5 points) Given the following snippet of code, what is the output to the console when the main is executed?

```
line 1: void func(int &p) {
line 2:     int i = 1; p++;
line 3:     cout << p << " " ;
line 4: }
line 5: int main() {
line 6:     int n = 15; func(n); cout << n<<endl;
line 7:     return 0;}
```

A. 16 15

B. 15 16

C. 16 16

D. 15 15

19. (5 points) Given the following snippet of code, what is the output to the console when the main is executed?

```
line 0: int n = 10;
line 1: void func(int p) {
line 2:     n++;
line 3:     cout << n << " " ;
line 4: }
line 5: int main() {
line 6:     cout << n<< " ";
line 7:     int n = 15;
line 8:     func(n);
line 8:     cout << n<<endl; return 0;}
```

A. 10 11 12

B. 10 11 15

C. 15 16 15

D. 15 16 16

SHORT ANSWER. Describe the code as instructed.

20. (20 points) What is printed to the screen when the following code is executed. Hint: Trace out or sketch out (using a table) the values of the variables during each iteration to organize and better determine the exact execution of the code.

```
line 1:
line 2: for(int i = 10; i >= 0; i--)
line 3:     {
line 4:     for(int j = 1; j <= i; j=j+2)
line 5:         cout << ( --i*j++ )<<" ";
line 6:     }
```

21. (20 points) A programmer has attempted to write a function that has an int array *grades[]* and an int n (assumed to be the size of the array) as parameters. The function counts and returns the number of A's in *grades[]* – any grade greater than or equal to 90. Identify AND clearly explain three errors (either syntax or logical) in this code.

```
line 1: int countA(int grades[], int n) {
line 2: double count = 0;
line 3: for( int i = 1; i < n; i++) {
line 4:     if (grades[i++] > 90)
line 5:         count++;
line 6: }
line 7:
line 8: return count;
line 9: }
```

CODING. Write code snippets as instructed. No need to include preprocessor directives. Just provide the code snippet requested.

22. (40 points) Define a function *stars* in C++ that has an input parameter int n, such that it prints an Isosceles triangle (exactly as shown below) of height n. For example stars(3) will output

```
  *
 ***
*****
```

Hint: Print spaces to center each row of stars.

23. (40 points) Define a function *isPrime* in C++, which has one parameter *num* which is an int. The function returns true if num is prime and returns false otherwise. You can assume num is a positive integer. A prime number is an integer that is **only** divisible, without remainder, by itself and the number 1. (All other integers between 1 and num-1 do not divide num without remainder.) For example: isPrime(5) returns true, isPrime(7) returns true, isPrime(10) returns false. You will assume 1 is not prime.

    Hint: Use the modulus operator % to help determine whether a number is prime.