What is your name?: ___________________________(3 points)

There are two sections:
I. True / False 48 points; (12 questions, 4 points each)
II. Multiple Choice 49 points; (7 questions, 7 points each)

97 + 3 points for name = 100 points total

This test is worth 15% of your final grade. For all problems you must put your answers on the bubble form using a #2 pencil. This test is open book and open notes. You have 50 minutes.

I. True / False Section: (4 pts. each) Select the best answer to each problem below. Be careful - some are tricky.

- If the answer is True, fill in a on your answer form. If the answer is False, fill in b on your answer form.
- Several problems ask you to determine whether something is valid. Something is valid if it would not generate a compiler error and would execute without the program crashing.

T F 1. Using 10 separate integer variables to store 10 test scores in a program is just as easy as declaring an array of 10 integers.

T F 2. Assume we have an array of integers called theNumbers that we would like to pass to a function called sumValues to calculate the sum of the values in the array. We also have a global constant called SIZE which is the size of the array. This function could be called from within main using:

```
sum = sumValues( theNumbers[ SIZE], SIZE);
```

T F 3. To pass a 2-dimensional array called matrixValues to a function, the sizes of both dimensions must be specified in the function declaration, such as:

```
void theFunction( int matrixValues[ 10][ 15])
```

T F 4. The following code is valid:

```cpp
int theNumbers[4] = {0,1,2,3};
for( int i=0; i<5; i++)
    cout << theNumbers[ i];
```

T F 5. The output from the following code is the numbers: 5 6 7 8

```cpp
int x=5;
while( x<8); { 
    cout << x << " ";
    x++;
}
```

T F 6. Any of the three looping structures (do, while, for) can be implemented using one of the other looping structures, with the possible addition of a few lines of code.
7. To ensure a character stored in variable \( c \) is upper case, we could use the following:

\[
\text{if( (c>='a') && (c<='z') )} \\
\quad c = c - ('a' - 'A');
\]

8. The expression \( x+++y \) will always have the same effect, regardless of how we might add parenthesis.

9. Given the declarations

\[
\text{int i;}
\text{char aWord[ 15];}
\]

If some section of code that writes to array \( aWord \) goes past the end of the array, it would eventually modify variable \( i \). This would not generate an error when the program is compiled.

10. A global constant can be defined as

\[
\text{#define SIZE=5;}
\]

11. The following is a valid identifier declaration and initialization:

\[
\text{int sum = 5;}
\text{int totalSum = 6;}
\text{sum + 1 = totalSum;}
\]

12. For truly random values in a program, it is important to use the \textit{srand}() function multiple times, however the number of times it is used must be an odd number, preferably a prime number.

II. Multiple Choice: (7 pts. each) For the following problems, select the best answer for each one and select the appropriate letter on your answer sheet. Be careful - more than one answer may seem to be correct.

13. Consider the binary search method demonstrated in class, where a person tries to guess a particular number between 1 and 1000. After each guess, the person is told if the number has been found, or if it is higher or lower. What is the minimum number of guesses a person would need to have to guarantee always finding the number?

a) 8  
b) 9  
c) 10  
d) 11  
e) None of the above
14. Consider the program given below. Its output can best be described as:

```cpp
#include <iostream>
using namespace std;
int main()
{
    int x;
    cout <<"Please enter a 3-digit positive integer: ";
    cin >> x;
    while (x > 0) {
        cout<< x % 10;
        x = x / 10;
    }
    cout<<"\n";
    return 0;
}
```

a) The remainder of the digits after dividing by 10
b) The input digits in reverse order
c) A tenth of the original input
d) All of the digits except the rightmost digit.
e) None of the above

15. Consider the program given below.

```cpp
#include <iostream>
using namespace std;
int main()
{
    int x = 0;
    int numbers[3][5]={ {1,2,3,4,5},
                         {6,5,4,8,2},
                         {9,3,6,8,1} }; 
    for( int i=0; i<5; i++ ) {
        for( int j=0; j<3; j++ ) {
            if( i != j )
                x = x + numbers[j][i];
        }
    }
    cout << x << "\n";
    return 0;
}
```

Its output can best be described as:

a) The sum of all of the numbers in the array
b) The sum of array values in positions where i is equal to j
c) The sum of all array values except for three of them.
d) The sum of all array values except for five of them.
e) None of the above
16. Consider the program given below.

```cpp
#include <iostream>
using namespace std;
int main()
{
    int x=0;
    char c;
    cout << "Please enter 3-digit positive integer: ";
    for (int i=0; i<3; i++)
    {
        cin.get(c);
        x = (x*10) + c - '0';
    }
    cout << x << "\n";
    return 0;
}
```

Its output can best be described as:

a) The same number given as input  
b) The input number times 10  
c) The input digits times 100 times each other  
d) The sum of the character values of the input characters  
e) None of the above

17. What is the output of the program given in the two columns below?

```cpp
#include <iostream>
using namespace std;
int a,b,c;
void confuse1(int  b, int a)
{
    a += 1;
    b += 2;
    c += 3;
}
void confuse2(int  &a, int &c)
{
    a += 2;
    b += 3;
    c += 4;
}
void confuse3(int &a, int c)
{
    a += 3;
    b += 4;
    c += 5;
}
int main()
{
    int b;
    a=b=c=1;
    confuse1( a, c);
    confuse2( b, b);
    confuse3( b, c);
    cout << a << b << c << endl;
    return 0;
}
```

a) 534  
b) 2104  
c) 259  
d) 1105  
e) None of the above
18. What is the output of the program given in the two columns below?

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

int a, b, c;

void confuse4(int b, int a)
{
    a += 1;
    b += 2;
    c += 3;
}

void confuse5(int *a, int c)
{
    *a += 2;
    b += 3;
    c += 4;
}

int main()
{
    int a, c;
    a = b = c = 1;
    confuse4(a, c);
    confuse5(&b, b);
    confuse6(&b, &c);
    cout << a << b << c << endl;
    return 0;
}
```

a) 1131  
b) 1142  
c) 1232  
d) 1212  
e) None of the above

19. What is the output of the program given below?

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

void theFunction(char w[], int x)
{
    char c;
    for (int i=0; i<x; i++)
    {
        c = w[i];
        w[i] = w[x-i-1];
        w[x-i-1] = c;
    }
}

int main()
{
    char array[] = {"eliminate all bigots");
    theFunction(array, 20);
    cout << array << "\n";
    return 0;
}
```

Its output is:

 a) The contents of the array in reverse order  
b) The contents of the array in the original order  
c) The contents of the array with the characters shifted over by one position  
d) The contents of the array with the original characters rearranged unrecognizeably  
e) None of the above