FORM 1 (Please put your name and form # on the scantron!!!!)
CS 161 Exam II:
True (A)/False(B) (2 pts each):

1. When you attach & after the dataType in the parameter list of a function, the variable following that dataType becomes a reference parameter. **T**

2. You can use a recursive algorithm to find the largest element in an array. **T**

3. The string expression strVar.replace(pos, n, str); starts at index pos, replaces the next n characters of strVar with all the characters of str. **F**

4. Suppose list is a one dimensional array of size 25, wherein each component is of type int. Further, suppose that sum is an int variable. The following for loop correctly finds the sum of the elements of list. **F**
   ```
   sum = 0;
   for (int i = 0; i < 25; i++)
       sum = sum + list;
   ```

5. All components of an array are of the same data type. **T**

6. In C++, [] is an array subscript operator that works by using address arithmetic and dereferencing. **T**

7. Consider the following statement:
   ```
   void pointerParameters(int* &p, double *q);
   ```
   In the function pointerParameters, the parameter q is a reference parameter. **F**

8. Arrays can be passed as parameters to a function by value, but it is faster to pass them by reference. **F**

9. When you pass an array as an argument, the starting address of the actual array is passed to the parameter. **F**

10. In C++, pointer variables are declared using the reserved word pointer. **F**

11. If you execute an infinite recursive function on a computer, the function executes until the system runs out of memory. **F**

12. Given the declaration int list[20]; the statement list[12] = list[5] + list[7]; updates the content of the twelfth component of the array list. **F**

13. If an array index goes out of bounds, the program always terminates in an error. **F**
14. The array index can be any integer less than the array size.
15. With recursion, the base case must eventually be reduced to a general case.
16. A memory leak is an unused memory space that cannot be re-allocated.
17. A pointer variable is a variable whose content is a memory address.
18. In the statement
   ```cpp
   int* p, q;
   ```
p and q are pointer variables.

Multiple Choice (3 pts each)

19. Consider the accompanying definition of a recursive function.
   ```cpp
   int recFunc(int num)
   {
       if (num >= 10)
           return 10;
       else
           return num * recFunc(num + 1);
   }
   ```
   What is the output of the following statement?
   ```cpp
   cout << recFunc(8) << endl;
   ```
   a. 4
   b. 8
   c. 72
   d. 720

20. A definition in which something is defined in terms of a smaller version of itself is called
    a(n) ____ definition.
    a. step-wise
    b. recursive
    c. member-wise
    d. iterative

21. Given the declaration `int *a;`, the statement `a = new int[50];` dynamically allocates an array of 50 components of the type ____.
    a. int
    b. int*
    c. pointer
    d. address
22. Which of the following solution methods would be the best choice for a mission control system?
   a. Iterative
   b. Direct recursive
   c. Indirect recursive
   d. Infinite recursive

23. Given the statement int *p;, the statement p++; will increment the value of p by ____ byte(s).
   a. one
   b. two
   c. four
   d. eight

24. Consider the accompanying definition of a recursive function.
   int puzzle(int start, int end)
   {
     if (start > end)
       return start - end;
     else if (start == end)
       return start + end;
     else
       return end * puzzle(start + 1, end - 1);
   }

   What is the output of the following statement?
   cout << puzzle(5, 10) << endl;

   a. 720
   b. 5040
   c. 5760
   d. 10800

25. Which of the following correctly declares name to be a character array and stores "William" in it?
   a. char name[6] = "William";
   b. char name[7] = "William";
   c. char name[8] = "William";
   d. char name[8] = 'William';

26. The C++ operator ____ is used to destroy dynamic variables.
   a. destroy
   b. delete
   c. *
   d. ~
27. What is the output of the following code?

```c++
int *p;
int x;
x = 76;
p = &x;
*p = 43;
```

```c++
cout << x <<", " << *p << endl;
```

a. 76, 76  
b. 76, 43  
c. 43, 76  
d. 43, 43

28. Consider the accompanying definition of a recursive function.

```c++
int foo(int n) {  //Line 1
    if (n == 0) {  //Line 3
        return 0;  //Line 4
    } else {  //Line 5
        return n + foo(n-1);  //Line 6
    }
}  //Line 7
```

Which of the statements represents the base case?

a. Statements in Lines 1-6.  
b. Statements in Lines 3 and 4.  
c. Statements in Lines 5 and 6.  
d. Statements in Lines 3, 4, and 5.

29. What is the value of alpha[2] after the following code executes?

```c++
int alpha[5];
int j;
for (j = 0; j < 5; j++)
    alpha[j] = 2 * j + 1;
```

a. 1  
b. 4  
c. 5  
d. 6

30. In C++, ____ is called the address of operator.

a. &  
b. *  
c. #  
d. ->
31. Which of the following can be used to initialize a pointer variable?
   a. 1
   b. NULL
   c. "0"
   d. '0'

32. In a row-major language using row order form, the ____.
   a. first row is stored first
   b. first row is stored last
   c. first column is stored first
   d. first column is stored last

33. In C++, the null character is represented as ____.
   a. '0'
   b. "0"
   c. '0'
   d. "0"

34. Considering the statement string str = "Gone with the wind"; , the output of the statement cout << str.find("the") << endl; is ____.
   a. 9
   b. 10
   c. 11
   d. 12

35. Suppose str = "xyzw"; After the statement str[2] = 'Y'; The value of str is
   a. xyzw
   b. xYzw
   c. xyYw
   d. xzYw

36. An array created during the execution of a program is called a(n) ____ array.
   a. list
   b. static
   c. execution
   d. dynamic

37. Consider the following declaration: char str[15]; Which of the following statements stores "Blue Sky" into str?
   a. str = "Blue Sky";
   b. str[15] = "Blue Sky";
   c. strcpy(str, "Blue Sky");
   d. strcpy("Blue Sky");
38. After the following statements execute, what are the contents of matrix?

```c
int matrix[3][2];
int j, k;
for (j = 0; j < 3; j++)
    for (k = 0; k < 2; k++)
        matrix[j][k] = j + k;
```

- a. 0 0
  1 1
  2 2
- b. 0 1
  2 3
  4 5
- c. 0 1
  1 2
  2 3
- d. 1 1
  2 2
  3 3

39. Assume you have the following declaration `char nameList[100];`. Which of the following ranges is valid for the index of the array `nameList`?

- a. 0 through 99
- b. 0 through 100
- c. 1 through 100
- d. 1 through 101

40. Consider the following declaration:

```c
char charArray[51];
char discard;
```

Assume that the input is:

```
Hello There!
How are you?
```

What is the value of `discard` after the following statements execute?

```c
cin.get(charArray, 51);
cin.get(discard);
```

- a. `discard = ' '` (Space)
- b. `discard = '!'`
- c. `discard = '\n'`
- d. `discard = '\0'`
41. Suppose that $\gamma$ is an array of 50 components of type int and $j$ is an int variable. Which of the following for loops sets the index of $\gamma$ out of bounds?
   a. for ($j = 0; j <= 49; j++$
      cout $<< \gamma[j] << " \";
   b. for ($j = 1; j < 50; j++$
      cout $<< \gamma[j] << " \";
   c. for ($j = 0; j <= 50; j++$
      cout $<< \gamma[j] << " \";
   d. for ($j = 0; j <= 48; j++$
      cout $<< \gamma[j] << " \";

42. Consider the following declaration: int alpha[5] = {3, 5, 7, 9, 11}. Which of the following is equivalent to this statement?
   a. int alpha[] = {3, 5, 7, 9, 11};//
   b. int alpha[] = {3 5 7 9 11};//
   c. int alpha[5] = {3, 5, 7, 9, 11};//
   d. int alpha[] = (3, 5, 7, 9, 11);/

43. Consider the following statement: double alpha[10][5];. The number of components of alpha is ____.
   a. 15
   b. 50
   c. 100
   d. 150

44. Given the following declaration:
   int $j$;
   int sum;
   double sale[10][7];

   which of the following correctly finds the sum of the elements of the fifth row of sale?
   a. sum = 0;
      for($j = 0; j < 7; j++$
         sum = sum + sale[5][$j$];
   b. sum = 0;
      for($j = 0; j < 5; j++$
         sum = sum + sale[4][$j$];
   c. sum = 0;
      for($j = 0; j < 10; j++$
         sum = sum + sale[5][$j$];
   d. sum = 0;
      for($j = 0; j < 10; j++$
         sum = sum + sale[4][$j$];

45. Consider the following statement: int alpha[25][10];. Which of the following statements about alpha is true?
   a. Rows of alpha are numbered 0...24 and columns are numbered 0...9.
   b. Rows of alpha are numbered 0...24 and columns are numbered 1...10.
   c. Rows of alpha are numbered 1...24 and columns are numbered 0...9.
   d. Rows of alpha are numbered 1...25 and columns are numbered 1...10.

46. Which of the following operations is allowed on pointer variables?
   a. exp
   b. %
   c. ==
   d. /

Extra Credit (2 pts each)

47. Consider the accompanying definition of the recursive function mystery.
   int mystery(int list[], int first, int last)
   {
       if (first == last)
           return list[first];
       else
           return list[first] + mystery(list, first + 1, last);
   }

   Given the declaration:
   int alpha[5] = {1, 4, 5, 8, 9};

   what is the output of the following statement?
   cout << mystery(alpha, 0, 4) << endl;
   a. 1
   b. 18
   c. 27
   d. 35

48. The following declares a c-string variable that has a total of 12 elements
   char str[]="hello world";

49. If p1 is an integer pointer variable, with the value of 1000, p1++ changes p1 to point to the memory location 1001.

50. The precondition(s) for a function describe:
   a. What is true after the function is executed
   b. What the function does
   c. How to call the function
   d. What must be true before the function executes
51. Which of the following function declarations will accept the following 2-D array?

```c
int pages[10][30];
```

- a. `void f1(int pages[][], int size);`
- b. `void f1(int pages[][30], int size);`
- c. `void f1(int pages[10][], int size);`
- d. none of the above