For questions 1 through 20 circle the correct answer. (2 pts each)

1. If an array is declared by `int b[5] = {3, 2};` then the first two entries of the array are assigned the values 3 and 2 respectively, and the remaining entries are assigned 2. (TRUE FALSE)

2. When passing a two-dimensional array to a function, the array parameter in the header or prototype for the function must include the second dimension, but it is not necessary to include the first. (TRUE FALSE)

3. If an array is declared by `double values[20];` then the identifier `values` is an array type but may be thought of and used as a constant pointer to a double. (TRUE FALSE)

4. When passing a one-dimensional array to a function, it is usually necessary to pass (through a separate variable) the array’s length or pass (as separate variables) integer values representing some sub-range of the array. (TRUE FALSE)

5. Suppose that `C` is an array declared by `double C[50];` and that `C` has been given values. If `C` is to be sorted by a sorting function `SORT` with one double array parameter and one integer parameter, then `SORT(C[0], 50);` would be a legitimate call to the function. (TRUE FALSE)

6. Consider the function header `void fct(const int A[], int S)` With this header, only integer arrays declared as constant could be passed to the parameter `A`. (TRUE FALSE)

7. Consider the function header `void fct(const int A[], int S)` An expression of the form `A[i]++;` (where `i` is an integer value) in the function definition would cause a compiling error. (TRUE FALSE)

8. An attempt to access an array element with an index that is not in the proper range during the run of a program will always result in premature termination of the program run. (TRUE FALSE)

9. When defining a new class, the closing right brace `}` is not followed by a semicolon. (TRUE FALSE)

10. When working with classes and class objects, the dot operator (.) and the scope resolution operator (::) can be used for the same purpose. (TRUE FALSE)

11. Encapsulation is the process of defining a class so that the programmer has full access to all data members and all member functions when writing a program that uses the class. (TRUE FALSE)

12. A member function that is used to assign new data to a class object, is called an “accessor” function. (TRUE FALSE)

13. If neither public nor private is used to specify data in a class definition, the declared data items are private. (TRUE FALSE)
14. If foo is a defined class, then the declaration `foo a();` would be a valid declaration of a foo object with no arguments.  (TRUE   FALSE)

15. If in defining a new class, no constructors are supplied by the programmer, a default one will automatically be created.  (TRUE   FALSE)

16. If in defining a class, constructors with arguments are supplied by the programmer, a default constructor (one with no arguments) will be automatically created if the programmer does not supply one.  (TRUE   FALSE)

17. Encapsulation is one of the primary goals of object oriented programming.  (TRUE   FALSE)

18. Software reuse is one of the primary goals of object oriented programming.  (TRUE   FALSE)

19. In a class definition, member functions are never placed in the private section of the class.  (TRUE   FALSE)

20. If a class member function will not alter any object connected to it by the dot operator, then it is best to declare that member function as constant in the class definition.  (TRUE   FALSE)

21. **(5 pts)** Suppose that A is an integer array of length N for some global constant N.  The function call `Is_Sorted(A, N)` should check the array A to see if it is sorted (in increasing order) and return **true** if it is and **false** if it is not sorted.  Write the complete function `Is_Sorted`. Just write the function; i.e.; you don’t need a main( ) or #includes. Note the function may not change the values in A nor may it copy them into another array.  *(Hint: An array is sorted if each of its elements is less than or equal to the element to the right.)*  For this function, the header is provided. Write your solution accordingly.

```cpp
bool Is_Sorted(int Y[], int Length) {
```
22. **(25 pts. [5 for each part])** The XYZ corporation builds widgets and uses computer software for widget inventories. The software incorporates the following class definition.

```cpp
class WIDGET{
private:
    int model;
    char color;
public:
    SetWIDGET(int, char);
    PrintWIDGET() const;
};
```

The model number must be one of 1001, 1002, 1003, or 1004. The color is either ‘R’, ‘W’, or ‘B’, representing red, white or blue.

The PrintWIDGET() function should print information about a widget object using complete sentences and full words. For example:

**The model is 1002. The color is blue.**

(a) If the declaration `WIDGET B;` is made, what can be said about the color and model for B at this point?

(b) As the class is defined, and assuming that all the functions have been written, would the declaration `WIDGET C(1002, ‘R’)` be allowed? If not, explain why?

(c) Write the complete member function definition for `PrintWIDGET()`. Be careful to observe the prototype in the class definition, so that the definition agrees with it.
(d) The member function `SetWIDGET` should set model to the first argument and color to the second argument, if valid arguments are given. If either of the two arguments is not a valid choice as indicated above, then `SetWIDGET` should print an error message and set model to 0 and color to a dash, ‘-’. Write the complete member function definition for `SetWIDGET(int, char)`. Observe the prototype and make sure your definition agrees with it.

(e) Why has the function `PrintWIDGET()` been declared with `const`?

23. (5 pts.) Explain why the following declaration is invalid:
   ```c
   int X[3] = {1, 2, 3, 4};
   ```

24. (5 pts.) Identify the error in the following code segment. Explain it completely.
   ```c
   const int N = 5;
   double X[N];
   for(i=0; i<=N; i++){
       cout << "Enter next number: ";
       cin >> X[i];
   }
   ```
25. **(5 pts.)** Suppose that $X$ is an array of characters, and $\text{ch}$ is a character variable; i.e., $\text{ch}$ holds a single character. The function call $\text{Is\_In\_Array}(X, N, \text{ch})$ should search the array $X$ from 0 to $N-1$ and return the first index for which $X$ at that index equals $\text{ch}$. If $\text{ch}$ is not in the array, it should return -1. Write the entire function definition, including the header, of $\text{Is\_In\_Array}$. Just write the function; i.e.; you don’t need a main( ) or #includes.

26. **(5 pts.)** Suppose a two-dimensional array has been declared by $\text{int } X[N][N]$; for some global constant $N$. The function call $\text{Set\_to\_Zero}(X, p, q)$ should set all entries of the first $p$ rows and $q$ columns to zero. Note: If you think of the array as a table, this is an upper-left handed rectangle in the table. Write the complete function. You may assume that both $p$ and $q$ are between 1 and $N$ inclusive. Just write the function; i.e.; you don’t need a main( ) or #includes.
27. (5 pts.) In order to implement Selection_Sort, one needs to be able to find the index of the largest value over some specified range of an array. Suppose \( X \) has been declared by double \( X[N] \); for some global constant \( N \). The function \textbf{Get_Max_Index}(X, L) should return the index between 0 and L inclusive which is the index of the largest element in \( X \) over that range. Write the complete function. Just write the function; i.e.; you don’t need a main( ) #includes.