1. When an array is passed to a procedure is a copy of the array made for the procedure or not? Why?

2. Examine each of the following code blocks. If there is a preprocessor or compile error, a logical (semantic) error, or a run-time error with program crash explain what is wrong. If there are no errors tell what will appear on the screen when the code is run.

2a.
```cpp
int i, total;
int sum[5] = { 2, 4, 6, 10, 2 };
total = 0;
for (i = 1 ; i <= 5 ; i++)
    total = total + sum[i];
cout << "\n total=" << total;
```

2b.
```cpp
int x, y, z;
x = 5;
y = -5;
z = 25;
cout << z/(z/x + y);
```

2c.
```cpp
int main() {
    char str[5] = "hello";
cout << "\n" << str;
}
```

3. Assuming that the character array str[] starts at (hexadecimal) location 0x01000, trace the following block of code and write exactly what appears on the screen when it is run (show spaces, newlines, and everything).

```cpp
char str[] = "greetings";
cout << "\n" << str;
cout << "\n" << str[4];
printf("\n %p ", &str[4]);
```

4. Write the code for the procedure whose prototype is given below:

```cpp
int count_vowels(char word[]);
```
which will accept a string (terminated with '\0') in the character array word[] and return the number of vowels (a vowel is one of the letters 'a', 'e', 'i', 'o', 'u') to the caller.

5. A programmer has written a function which will swap the contents of two integer variables:
void swap(int x, int y) {
    int temp;
    temp = x;
    x = y;
    y = temp;
    return;
}

Will this work as intended? Why or why not? If not, fix the code so that it will work.

6. You are going to write a demographics program which asks each user for his or her street address. Would it be better to get the street address all at once with cin, would it be better to use a loop and get one character at a time (making sure you don’t overwrite the array boundaries) with cin.get() ending when \n is received, or would it be better to use cin.getline()? Justify your answer.

7. Look at the variables and labels in this short program segment and tell which part of memory they are in: code segment, initialized global data, non-initialized global data/heap, or stack. Also tell what the scope of each identifier is.

    int outside;
    int status=5;
    int main() {
        int array[5];
        char *globdata;
        int i;
        printf("\n outside is at %p", &outside )
        printf("\n status is at %p", &status )
        printf("\n tag is at %p", &tag )
        tag:
        globdata = new char[8192];
        printf("\n globdata is at %p", globdata )
        int inside[10];
        for (int j = 0 ; j < 4 ; i++) {
            inside[j] = j;
            printf("\n inside[%d]=%d at %p",
                j, inside[j], &inside[j]);
        }
    }

8. Suppose that there is a file named tmpfile in the current directory and that is contains two numbers 34.3 and 56.7 separated by whitespace. What will appear on the screen when the following block of code is run?

    ifstream inputfile;
    double next, sum = 0.0;
    inputfile.open("tmpfile");
    inputfile >> next;
    sum = sum + next;
    inputfile >> next;
sum = sum + next;
cout << "total=" << sum;
inputfile.close();

9. What appears on the screen when the following block of code is run?
char str1[] = "People";
char str2[] = "Soft";
char str3[128];
strcpy(str3, str1);
strcat(str3, str2);
cout << "\n" << str3 << " has " << strlen(str3) << " letters";

10. One programmer says that using a structure to hold information about each of his company’s clients would be simple, efficient and a good idea. A second programmer has told him that since some of the information (e.g. credit rating) is sensitive, he would be better advised to use a class and take the time to declare some fields private and control access through member functions. Which programmer do you think has given the better advice and why?

11. A programmer declares the following class, in which he has put the raw grades in the private area. Passing is 70% or better and the field member pass is set to 0 (not passing) or to 1 (passing). what should the two member functions do? Which might require some authentication?

```cpp
class record {
public:
    int pass;
    void set_pass(void);
    void set_grades(int, int []);
private:
    int grades[100];
    int num;
};
```