CMPS-222 Final Exam

Carefully indicate your answers please.

Multiple choice 2-pts each.

1. A function
   A. cannot change the value of a static variable.
   B. always has a return type.
   C. must have at least one parameter variable.
   D. should always return some value to main().

2. Dividing a program into several functions
   A. will slow down your overall programming effort.
   B. makes the program easier to read and understand.
   C. makes the program run faster.
   D. requires more variables to be created.

3. A static local variable within a function
   A. is a constant value.
   B. must be initialized with zero.
   C. may be changed every time the function is called.
   D. cannot be returned by the function.

4. When a function terminates,
   A. it always branches back to main.
   B. its local variables are lost.
   C. memory is freed.
   D. the exit function is called.

5. When an array name is passed to a function, what is actually being passed?
   A. all the array values
   B. the first array value
   C. the address of the array's first element
   D. the array subscript

6. Our textbook describes a way of visualizing a 2-dimensional array as having rows and columns. Which statement displays the contents of the last column of the last row of this array: int sales[12][7]
   A. cout << sales[12][7];
   B. cout << sales[11][6];
   C. cout << sales[11][7];
   D. cout << sales[13][8];

7. Which for-loop below will not iterate exactly 11 times?
   A. for (int i=0; i<22; i+=2)
   B. for (int i=1; i<22; i+=2)
   C. for (int i=21; i>1; i-=2)
   D. for (int i=21; i>0; i-=2)
8. Which of the following will work as an array's size declarator?
(select 2)

A. a named constant value of zero or above
B. a literal value greater than 1
C. a named constant value greater than 0
D. any literal or named constant value

9. A float type is the same size as an int type. Look at the two statements below.

float x = 4.0;
float *ptr = &x;

What happens after the following statement executes?

ptr = ptr + 2;

A. the value of *ptr will increase by 8
B. the value of *ptr will increase by 4
C. the value of ptr will increase by 4
D. the value of ptr will increase by 8

10. Look at the following array definition.

int numbers[] = { 2, 4, 6, 8, 10, 12 };

2 is the 1st element of the array.
What will the following statement display?

cout << *(numbers + 3) << endl;

A. 6
B. the 3rd element of the array
C. the 4th element of the array
D. 12

11. What is required to return a pointer from a function?

A. the pointer must be an int type
B. if the function return type must be a pointer
C. the function must have no arguments
D. the function cannot dynamically allocate memory

12. If you dynamically allocate memory to a pointer with new, what should you not do before freeing the pointer's memory with a delete statement?

A. use pointer arithmetic to changes the pointer's value
B. copy the pointer to another pointer variable
C. use the pointer in a function
D. dereference the pointer
13. Look at the following array definition.

```c
int set[10];
```
Which of the following statements will store the value 99 in set[5]?

B. `set+5 = 99;`
C. `*(set+5) = 99;`
D. `*(set+4) = 99;`

14. Look at the following function header for a member function.

```c
void Circle::getRadius()
```
What is the name of the function?

A. Circle
B. `getRadius`
C. member
D. `void function`

15. Choose the valid function header below.

A. `void ++operator()`
B. `operator int(MyClass &m)`
C. `X operator++(int)`
D. `Class operator()`

16. Template functions?

A. Will usually reduce the size of your source code.
B. Will usually increase the size of your source code.
C. Will usually reduce the size of your executable file.
D. Will usually increase the execution speed of your program.

17. Choose the true statement below

A. Class members are public by default
B. Class members are private by default

18. A class destructor

A. is executed when a class goes out of scope.
B. should always return a NULL value.
C. should be called directly before your program ends.
D. is called with the ~ command.

19. If your class has two constructors defined...

A. it must also have two destructors.
B. one constructor will have a parameter list of (int).
C. dynamic memory allocation is being done.
D. one is not a default constructor.
20. If you see the following line of code in a C++ program, what do you know to be true?

```cpp
Shape circle(15.0);
```

A. There is a constructor named circle that accepts an argument.
B. There is a class definition named circle.
C. There is a class named Shape with a user-defined constructor.
D. There is a class instance named Shape.

Remaining questions are 4-points each.

21. Name the four features of object oriented design/programming.

   abstraction
   encapsulation
   inheritance
   polymorphism

22. What is the exact output of the following code? Draw a box around your answer.

```cpp
char a[] = "CSU-Bakersfield";
a[2] = '∅';
cout << a << strlen(a) * 37 * 3;
```

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23. Given an integer x, write an expression that will print the word YES if x is greater than 5 but not greater than 25.

```cpp
if (x > 5 && x <= 25)
cout << "YES";
```

24. Write a for-loop that will fill each element of the following array with a unique odd number.

```cpp
int arr[1000];
for (int i=0; i<1000; i++)
    arr[i] = i*2+1;
```
25. Write a complete program that has a template function named `getSquare`. The function will accept an argument and return the squared value of the argument. You can calculate the square by multiplying the argument times itself. Your main function should ask the user to input an integer and a float value, and display the values squared using your template function.

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

template <class T>
T getSquare(T num) {
    return num * num;
}

int main() {
    int i;
    float f;
    cout << "Input an integer followed by a float: ";
    cin >> i >> f;
    cout << "Squared values: " << getSquare(i) << " and ";
    cout << getSquare(f) << endl;
    return 0;
}
```

26. Define a class named `MyNumber` that has a member variable that stores an integer or float. Include in your class definition a function that overloads the multiply operator such that you could pass a MyNumber object to your `getSquare` template function (defined in the previous question).

```cpp
 several ways to do this.
 points for a function that received an argument, did a multiply, and returned a MyNumber type.

class MyNumber {
    int num;
public:
    MyNumber operator*(MyNumber &m) {
        MyNumber tmp;
        tmp.num = num * m.num;
        return tmp;
    }
};
```
27. Write a class definition for **MySearchClass** that will work with the following main function. Your class should dynamically allocate memory to store an array. At a minimum, your class will need member variables, a constructor, a destructor, and a member function. Your **find** function will search the array and return the index where found, else return -1.

```cpp
int main()
{
    int arr[] = { 5, 25, 7, 16, 19, 21, 11, 6, 13 };
    int n = 9;

    MySearchClass msc(arr, n);
    cout << msc.find(21) << endl;
    cout << msc.find(6) << endl;
    cout << msc.find(17) << endl;
    return 0;
}
```

Output should be:
5
7
-1

Write your class here...

```cpp
class MySearchClass {
    int *arr;
    int n;
public:
    MySearchClass(int *a, int x) {
        arr = new int[x];
        n = x;
        for (int i=0; i<n; i++)
            arr[i] = a[i];
    }
    int find(int v) {
        for (int i=0; i<n; i++) {
            if (arr[i] == v)
                return i;
        }
        return -1;
    }
~MySearchClass() { delete [] arr; }
};
```