CS250 Exam #3 Review Material

- Inheritance
- Superclass
- Subclass
- Base class
- Derived class
- is-a
- has-a
- composition
- overloading
- access specifiers: public vs private vs protected
- this, *this
- regular variable versus pointer variable (int versus int *, char versus char *, …)
- sizeof
- address operator &
- dereference operator *, ->
- pointer operations (pInt + 2, *(pInt + 2), ++pInt, pInt++…)
- activation record
- difference between arrays and pointers
- writing code using array notation versus pointer notation
- pointers as function arguments
- int * versus const int * versus int * const
- UML Diagrams

1. Work all problems listed in the lecture notes
2. List three uses of * in C++
3. Assume pInt points to a 4-byte int and has the address 500. What is the value of pInt after: a) ++pInt; b) pInt += 5;
4. Consider char *pCh = "abc123";
   Which of the following have meaning? a) &pCh[0] < &pCh[3]
   b) pCh != &pCh[0] c) *pCh != *(pCh + 1)
5. A double array **aValues** contains **size** values in the array. The median value is the middle value. If the array contains an even number of values, the median is the average of the two middle values. Write a function median that accepts the array aValues and size and returns a

double representing the median of the array of values. Use pointer notation only.

6. A Cube is derived from a Rectangle. The Rectangle and Cube are to have appropriate constructors. The Rectangle is to have an area function and a Cube is to have a volume function. First, write the UML diagram that shows this inheritance and then write the C++ code to declare & define each class.
7. Time can be displayed in Regular Time or Military Time. Examples:
   Military Time is 22:00:00
   Regular Time is 10:00:00 PM
   Write the proper UML diagram for MilitaryTime and RegularTime.
8. If you want a real challenge, write the C++ interface and implementation for your UML design. This would be time well spent reviewing for exam 3. Most likely, you will make a ton of mistakes that you will then not make on the exam. This seriously is a very cool problem!!!! ☺

Regular Time	Military Time	Regular Time	Military Time
12:00 a.m.	0000	12:00 p.m.	1200
1:00 a.m.	0100	1:00 p.m.	1300
2:00 a.m.	0200	2:00 p.m.	1400
3:00 a.m.	0300	3:00 p.m.	1500
4:00 a.m.	0400	4:00 p.m.	1600
5:00 a.m.	0500	5:00 p.m.	1700
6:00 a.m.	0600	6:00 p.m.	1800
7:00 a.m.	0700	7:00 p.m.	1900
8:00 a.m.	0800	8:00 p.m.	2000
9:00 a.m.	0900	9:00 p.m.	2100
10:00 a.m.	1000	10:00 p.m.	2200
11:00 a.m.	1100	11:00 p.m.	2300

9. The string function strcmp compares two C strings and returns -1 if the first string is less than the second string, 1 if the first string is greater than the second or 0 if the two strings are equal. Write and test this function given a function prototype of:

```
int strcmp (const char *pszStr1, const char *pszStr2);
```

10. What does the following program output?

```
#include <iostream>
#include <cstring>

int main ()
{
  char szStr1[] = "ABC123",
                *pszStr1 = szStr1;
  char szStr2[] = "ABC";

  std::cout << pszStr1 << *pszStr1 << std::endl;
  std::cout << *pszStr1++ << std::endl;
  std::cout << ++*pszStr1 << std::endl;

  for (int i = 0; i < strlen (szStr2); ++i)
  {
          std::cout << (szStr2 + i) << *(szStr2 + i) <<
(*szStr2 + i) << std::endl;
     }

     return 0;
}
```

11. An integer array **aValues** contains **size** values. Using pointer notation, write each of the following functions:

a) Exchange two values in the array aValues. The function accepts aValues, size, and two index values whose element values are to be exchanged.

b) Insert accepts the array aValues, size, a position, and a value. Insert the value at the given position adjusting the remaining elements in the array.