Northern Michigan University (Marquette Co, MI)

Time: 50 minutes

For the following programs, write the code as directed. Do not worry about #include files or minor syntactic errors such as semicolons or matching braces. However, your code should be as correct as possible. Make sure all special cases are handled correctly. Make sure you call and use all methods correctly. If you write more than one method to solve a problem, make sure you declare your headers correctly, but you don't have to worry about prototypes.

1. Consider these classes:

```
class LL {                     class LLN {
 private:                       private:
   LLN *head;                      int i;
};                                 LLN *next;
                               };
```

which form a linked list.

Write a method `int LL::sumofsquares()` that returns the sum of the squares of each number in the list. For example, if the linked list is -->1-->2-->3, the method would return 1*1+2*2+3*3 = 14. Do not use loops; use recursion only.

2. Using the above definitions, write a method `int LL::removesquare()` which removes the nodes at positions that are perfect squares. In other words, it removes, the first, fourth, ninth, sixteenth, etc. nodes. For example, if the linked list contained -->4-->9-->8-->5-->7, the linked list would become -->9-->8-->7. Do not use loops, use recursion only. You may assume that constructors, destructors, accessors, and mutators are already written; you must write every other helper method you use. Do not alter the data field of any node; just remove the ones that need to go. Do not worry about memory leaks. (double sqrt (double a) returns the square root of a).

3. Write code for the following method:

```
void asciifile (string newfl, string orig);
```

This opens an existing file whose name is in orig, and creates a file whose name is in newfl. It will read the characters one at a time from the existing file, converting each character in the original file to its ASCII value and writing the ASCII value out to the new file, each followed by a Windows line break. For example, if the original file were HELLO\r\n, the new file would be

72
69
76
76
79
13
10

4. Given the following class:

```
public class Stuff {

 virtual int cmp (Stuff *b) = 0; //a->cmp (b) returns negative if a < b,
                                 //positive if a > b, 0 if a=b
 virtual void print () = 0;      //prints myself out.
};
```

Write the method **void Middle (Stuff *a, Stuff *b, Stuff *c)** which prints whichever of the three parameters is in the middle (neither smallest nor largest).