

ENG236 Computer Programming

Solution to Quiz 17 (9 February 2010)

Instructions: open book, 25 minutes (100 marks + 200 marks bonus)

The screen shot below is the output of running the program below. The program creates a list of CAT objects and then deletes all of them.

```

C:\Windows\system32\cmd.exe
Enter the number (> 0) of cats: 10
Cat #: 0
Cat #: 1
Cat #: 2
Cat #: 3
Cat #: 4
Cat #: 5
Cat #: 6
Cat #: 7
Cat #: 8
Cat #: 9
After calling the removeAll() function, the list is empty.
Press any key to continue . . . =
    
```

Your tasks are to fill in the codes for the function `remove()` and `removeAll()`. Note that `removeAll()` must be implemented using `remove()`.

```

#include <iostream>
using namespace std;
class CAT //Use a number CatNum to represent a
cat
{
public:
    CAT() {pNext=0;}
    ~CAT(){};
    int GetNum() const {return CatNum;}
    void SetNum(int num) {CatNum = num;}
    CAT * GetNext() {return pNext;}
    void SetNext(CAT *pN) {pNext = pN;}
private:
    int CatNum;
    CAT *pNext;
};
    
```

```

CAT * create(int n)
{ //Create a linked list
    CAT *pH,*pT,*pL;
    int i;
    pH = new CAT;
    pL = pH;
    pL->SetNum(0);
    for (i=1; i<n; i++)
    { pT = new CAT;
      pL->SetNext(pT);
      pL = pT;
      pL->SetNum(i);
    } // pL points to last item
    return pH;
}
    
```

```

// A function to remove the first CAT object on
// the list pointed to by pH
CAT * remove(CAT *pH)
{
    if (!pH) return pH;
    
```

```

        CAT *pCurr = pH;
        pH = pH->GetNext();
        delete pCurr;

        return pH;
    
```

```

}

// A function to remove all the CAT objects on
// the list pointed to by pH. This function MUST
// be implemented based on remove().
CAT * removeAll(CAT *pH)
{
    if (!pH) return pH;
    
```

```

        do
        {
            pH = remove(pH);
        }
        while (pH != 0);

        return pH;
    
```

```

}

int main()
{
    int num;
    CAT *pHead, *pTemp;
    cout << "Enter the number (> 0) of cats: ";
    cin >> num;

    pHead = create(num);
    pTemp = pHead;
    do
    {
        cout << "Cat #: " << pTemp->GetNum() << endl;
        pTemp = pTemp->GetNext();
    }
    while (pTemp!=0);

    cout << "After calling the removeAll() function,";
    pHead = removeAll(pHead);
    if (!pHead)
        cout << " the list is empty.\n";

    return 0;
}
    
```