

CS 385
Homework Assignment 3
Due by Wed, Oct 8, 2008, 1pm

Prof. Dietrich

Assignment

Write a C program to do addition and subtraction of polynomials with integer coefficients, such as

$$7x^5 + 9x^3 - 2x + 8.$$

Implement a polynomial as a linked list of nodes, where now, a node is a struct as follows.

```
typedef struct node {
    int power;
    int coef;
    struct node * next;
} NODE;
typedef NODE * Polynomial;
```

If n, m are pointers to nodes in a list representing a polynomial, and $m = n \rightarrow \text{next}$, then $(n \rightarrow \text{power}) > (m \rightarrow \text{power})$.

For example, the polynomial $x^4 - 3x^2 + 3x + 4$ is represented by the list

$\rightarrow(4,1) \rightarrow(2, -3) \rightarrow(1,3) \rightarrow(0,4) \rightarrow \text{NULL}$.

Then addition and subtraction are carried out in a way that is similar to the merge algorithm.

Implement each of

```
Polynomial getpoly();
Polynomial add(Polynomial p1, Polynomial p2);
Polynomial sub(Polynomial p1, Polynomial p2);
void printp(Polynomial p1);
```

in such a way that after each operation `add`, `sub`, `printp`, is executed, then `p1` and `p2` are not changed. The function `getpoly()` returns the polynomial entered by the user. The function `printp` prints the standard representation of the polynomial to the screen.

Your program should enable the user to enter two polynomials, say P, Q , and then print out $P + Q$ and $P - Q$ in a reasonable form.

Submit

- A clear description of the algorithm for adding two polynomials.
- Using `script`, the source code of your program, the compilation, and an example of the output of your program, when adding two polynomials of degree 27.