// C++ program for addition of two polynomials

#include<bits/stdc++.h>

using namespace std;

struct Node

{

int coeff;

int pow;

struct Node \*next; };

void create\_node(int x, int y, struct Node \*\*temp)

{

struct Node \*r, \*z;

z = \*temp;

if(z == NULL)

{

r =(struct Node\*)malloc(sizeof(struct Node));

r->coeff = x;

r->pow = y;

\*temp = r;

r->next = (struct Node\*)malloc(sizeof(struct Node));

r = r->next;

r->next = NULL;

}

else

{ r->coeff = x;

r->pow = y;

r->next = (struct Node\*)malloc(sizeof(struct Node));

r = r->next;

r->next = NULL;

}

}

// Function Adding two polynomial numbers

void polyadd(struct Node \*poly1, struct Node \*poly2, struct Node \*poly)

{

while(poly1->next && poly2->next)

{ // If power of 1st polynomial is greater then 2nd, then store 1st as it is

// and move its pointer

if(poly1->pow > poly2->pow)

{ poly->pow = poly1->pow;

poly->coeff = poly1->coeff;

poly1 = poly1->next;

}

// If power of 2nd polynomial is greater then 1st, then store 2nd as it is

// and move its pointer

else if(poly1->pow < poly2->pow)

{ poly->pow = poly2->pow;

poly->coeff = poly2->coeff;

poly2 = poly2->next;

}

// If power of both polynomial numbers is same then add their coefficients

else

{ poly->pow = poly1->pow;

poly->coeff = poly1->coeff+poly2->coeff;

poly1 = poly1->next;

poly2 = poly2->next;

}

// Dynamically create new node

poly->next = (struct Node \*)malloc(sizeof(struct Node));

poly = poly->next;

poly->next = NULL;

}

while(poly1->next || poly2->next)

{

if(poly1->next)

{

poly->pow = poly1->pow;

poly->coeff = poly1->coeff;

poly1 = poly1->next;

}

if(poly2->next)

{

poly->pow = poly2->pow;

poly->coeff = poly2->coeff;

poly2 = poly2->next;

}

poly->next = (struct Node \*)malloc(sizeof(struct Node));

poly = poly->next;

poly->next = NULL;

}

}

// Display Linked list

void show(struct Node \*node)

{

while(node->next != NULL)

{

printf("%dx^%d", node->coeff, node->pow);

node = node->next;

if(node->next != NULL)

printf(" + ");

}

} // Driver program

int main()

{ struct Node \*poly1 = NULL, \*poly2 = NULL, \*poly = NULL;

// Create first list of 5x^2 + 4x^1 + 2x^0

create\_node(5,2,&poly1);

create\_node(4,1,&poly1);

create\_node(2,0,&poly1);

// Create second list of 5x^1 + 5x^0

create\_node(5,1,&poly2);

create\_node(5,0,&poly2);

printf("1st Number: ");

show(poly1);

printf("\n2nd Number: ");

show(poly2);

poly = (struct Node \*)malloc(sizeof(struct Node));

// Function add two polynomial numbers

polyadd(poly1, poly2, poly);

// Display resultant List

printf("\nAdded polynomial: ");

show(poly);

return 0; }