//Scanf trick, Pascle Triangle

//Uva 11955 - Binomial Theorem

long long p[55][54];

void buildPascle() //Building Pascle of 50 rows

{

p[0][0] = 1;

p[1][0] = p[1][1] = 1;

for(int i = 2; i <= 50; i++)

for(int j = 0; j <= i; j++) {

if(j == 0 || j == i)

p[i][j] = 1;

else

p[i][j] = p[i-1][j-1] + p[i-1][j];

}

/\* Uncomment this if you want to see the full triangle

for(int i = 0; i <= 50; i++) {

for(int j = 0; j <=i; j++)

printf("%lld ", p[i][j]);

printf("\n");

}

\*/

return;

}

int main() {

buildPascle();

int t;

scanf("%d", &t);

char in[120];

for(int Case = 1; Case <= t; Case++) {

char a[100], b[100], n[20];

int pw;

//\* is used for skipping

scanf(" %\*[(] %[^+] %\*[+] %[^)] %s", a, b, n);

//%\*[(] skipping (

//%[^+] take input until +

//%\*[+] skipping +

//%\*[^)] skipping ^ and )

pw = atoi(n+2);

printf("Case %d: ", Case);

if(pw == 1) {

printf("%s+%s\n", a, b);

continue;

}

for(int i = 0; i <= pw; i++) {

//printing the first number

if(p[pw][i] != 1)

printf("+%lld\*", p[pw][i]);

//the first variable

if(pw-i == 1)

printf("%s", a);

else if(pw-i > 0)

printf("%s^%d", a, pw-i);

//the second variable

if(i == 1)

printf("\*%s", b);

else if(i == pw)

printf("+%s^%d\n", b, i);

else if(i != 0)

printf("\*%s^%d", b, i);

}

}

return 0;

}