**Binary addition and subtraction of two numbers:**

**Algorithm:**

Step 1: Start.

Step 2: Initialize and take number inputs in decimal.

Step 3: Initialize array of specific bit size first and second.

Step 4: Convert the first decimal number to binary. If the number is negative, compute the two’s complement for the number and store it in first.

Step 5: Convert the first decimal number to binary. If the number is negative, compute the two’s complement for the number and store it in second.

Step 6: Initialize two arrays sum and diff to store the sum of two numbers and their differences respectively.

Step 7: Add two numbers first and second and store the result in array sum. Print the output.

Step 8: 2’s complement the number in second array and add it with the first array. Store the output in array diff and print the output.

Step 9: Stop.

**Source code:**

*#include <stdio.h>*

*#include <stdlib.h>*

*#define SIZE 5*

*void decimalToBinary(int n, int \*binary, int size) {*

*if (n < 0) {*

*n = abs(n);*

*}*

*for (int i = size - 1; i >= 0; i--) {*

*binary[i] = n % 2;*

*n = n / 2;*

*}*

*}*

*void twosComplement(int \*binary, int size) {*

*int carry = 1;*

*for (int i = 0; i < size; i++) {*

*binary[i] = binary[i] == 0 ? 1 : 0;*

*}*

*for (int i = size - 1; i >= 0; i--) {*

*binary[i] = binary[i] + carry;*

*if (binary[i] == 2) {*

*binary[i] = 0;*

*carry = 1;*

*} else {*

*carry = 0;*

*}*

*}*

*}*

*void addTwoBinaries(int \*binary1, int \*binary2, int size) {*

*int carry = 0;*

*for (int i = size - 1; i >= 0; i--) {*

*binary1[i] = binary1[i] + binary2[i] + carry;*

*if (binary1[i] == 2) {*

*binary1[i] = 0;*

*carry = 1;*

*} else if (binary1[i] == 3) {*

*binary1[i] = 1;*

*carry = 1;*

*} else {*

*carry = 0;*

*}*

*}*

*}*

*void subtractTwoBinaries(int \*binary1, int \*binary2, int size) {*

*int twosComp[SIZE];*

*for (int i = 0; i < size; i++) {*

*twosComp[i] = binary2[i];*

*}*

*twosComplement(twosComp, size);*

*addTwoBinaries(binary1, twosComp, size);*

*}*

*void printBinary(int \*binary, int size) {*

*for (int i = 0; i < size; i++) {*

*printf("%d", binary[i]);*

*}*

*printf("\n");*

*}*

*int main() {*

*int a1, b1, a[SIZE], b[SIZE];*

*printf("Enter the first number: ");*

*scanf("%d", &a1);*

*printf("Enter the second number: ");*

*scanf("%d", &b1);*

*printf("\n");*

*decimalToBinary(a1, a, SIZE);*

*if (a1 < 0) {*

*twosComplement(a, SIZE);*

*}*

*printf("First number in binary: ");*

*printBinary(a, SIZE);*

*decimalToBinary(b1, b, SIZE);*

*if (b1 < 0) {*

*twosComplement(b, SIZE);*

*}*

*printf("Second number in binary: ");*

*printBinary(b, SIZE);*

*printf("\n");*

*int sum[SIZE];*

*for (int i = 0; i < SIZE; i++) {*

*sum[i] = a[i];*

*}*

*addTwoBinaries(sum, b, SIZE);*

*printf("Sum of the given two numbers: ");*

*printBinary(sum, SIZE);*

*int diff[SIZE];*

*for (int i = 0; i < SIZE; i++) {*

*diff[i] = a[i];*

*}*

*subtractTwoBinaries(diff, b, SIZE);*

*printf("Difference of the given two numbers: ");*

*printBinary(diff, SIZE);*

*return 0;*

*}*

**Sample input/output:**

* Input of 7 and -3

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Description automatically generated**

* Sample output for above input

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Description automatically generated**