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#include <stdio.h> //C
#include <stdlib.h>
#include <math.h>
int decimalValue (int a[], int radix, int length);

int main(void) {
    int i;
    int a[] = {1,1,0,1,0,1};
    int a8[] = {6,5};
    int lengthA = 6;
    int b[] = {0,1,1,0,1,1,1,0};
    int b8[] = {1,5,6};
    int lengthB = 8;
    int radix = 2;

    printf("\nThe decimal value of 110101 is %d.\n", decimalValue (a, radix, lengthA));
    printf("\nThe decimal value of 01101110 is %d.\n", decimalValue (b, radix, lengthB));
    printf("\nThe decimal value of 65 base 8 is %d.\n", decimalValue (a8, 8, 2));
    printf("\nThe decimal value of 156 base 8 is %d.\n", decimalValue (b8, 8, 3));

    return EXIT_SUCCESS;
}

int decimalValue (int a[], int s, int length) {
    int i, n = 0;
    for (i = 0; i < length; i++) {
        printf("\ni = %d\t%d * %g = %g",i, a[length - 1 - i],
            pow(s,i), a[length - 1 - i] * pow(s,i));
        n += a[length - 1 - i] * pow(s,i);
    }
    return n;
}
/*
i = 0 1 * 1 = 1
i = 1 0 * 2 = 0
i = 2 1 * 4 = 4
i = 3 0 * 8 = 0
i = 4 1 * 16 = 16
i = 5 1 * 32 = 32
The decimal value of 110101 is 53.

i = 0 0 * 1 = 0
i = 1 1 * 2 = 2
i = 2 1 * 4 = 4
i = 3 1 * 8 = 8
i = 4 0 * 16 = 0
i = 5 1 * 32 = 32
i = 6 1 * 64 = 64
i = 7 0 * 128 = 0
The decimal value of 01101110 is 110.

i = 0 5 * 1 = 5
i = 1 6 * 8 = 48
The decimal value of 65 base 8 is 53.

i = 0 6 * 1 = 6
i = 1 5 * 8 = 40
i = 2 1 * 64 = 64
The decimal value of 156 base 8 is 110.
*/

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public class DecimalValue {                                //Java

    public static void main(String[] args) {
        int a[] = {1,1,0,1,0,1}; //binary 110101
        int a8[] = {6,5}; //octal 65
        int b[] = {0,1,1,0,1,1,1,0}; //binary 01101110
        int b8[] = {1,5,6}; //octal 156
        int radix = 2;

        System.out.println("\nThe decimal value of 110101 is " +
            DecimalValue.decimalValue (a, radix) + ".\n");
        System.out.println("The decimal value of 01101110 is " +
            DecimalValue.decimalValue (b, radix) + ".\n");
        System.out.println("The decimal value of 65 base 8 is " +
            DecimalValue.decimalValue (a8, 8) + ".\n");
        System.out.println("The decimal value of 156 base 8 is " +
            DecimalValue.decimalValue (b8, 8) + ".\n");
        System.out.println("The decimal value of 0.110101 is " +
            DecimalValue.decimalValueMantissa(a, radix));
        System.out.println("The decimal value of 0.156 base 8 is " +
            DecimalValue.decimalValueMantissa(b8, 8));

    }

    public static int decimalValue (int a[], int s) {
        int i, n = 0;
        for (i = 0; i < a.length; i++) {
            //System.out.println("i = " + i + "\t" + a[a.length - 1 - i] + " * "
            // + Math.pow(s,i)+ " = " + a[a.length - 1 - i] * Math.pow(s,i));
            n += a[a.length - 1 - i] * Math.pow(s,i);
        }
        return n;
    }

    public static double decimalValueMantissa (int a[], int s) {
        int i, j;
        double n = 0;
        for (i = 0, j = -1; i < a.length; i++, j--) {
            System.out.println("i = " + i + "\t" + "j = " + j + "\t" + a[i] + " * "
                + Math.pow(s,j)+ " = " + a[i] * Math.pow(s,j));
            n += a[i] * Math.pow(s,j);
        }
        return n;
    }
}
/*
The decimal value of 110101 is 53.
The decimal value of 01101110 is 110.
The decimal value of 65 base 8 is 53.
The decimal value of 156 base 8 is 110.

i = 0 j = -1      1 * 0.5 = 0.5
i = 1 j = -2      1 * 0.25 = 0.25
i = 2 j = -3      0 * 0.125 = 0.0
i = 3 j = -4      1 * 0.0625 = 0.0625
i = 4 j = -5      0 * 0.03125 = 0.0
i = 5 j = -6      1 * 0.015625 = 0.015625
The decimal value of 0.110101 is 0.828125
i = 0 j = -1      1 * 0.125 = 0.125
i = 1 j = -2      5 * 0.015625 = 0.078125
i = 2 j = -3      6 * 0.001953125 = 0.01171875
The decimal value of 0.156 base 8 is 0.21484375
*/

```