**Question 1:** Suppose a digital camera has a storage capac- ity of 500MB. How many black-and-white pho- tographs could be stored in the camera if each consisted of 512 pixels per row and 512 pixels per column if each pixel required one bit of storage?
**(6 Points)**

$500\ MB = 500 \times 1024 \times 1024 \times 8 = 4 \times 10^{23}$ bits

$512 \times 512 = 2^{18}$ bits

$4 \times 10^{23} / 2^{18} = 4 \times 10^5 = 400.000$ photographs

**Question 2:** What bit patterns are represented by the following hexadecimal notations?
**a. 8A9 b. DCB c. A01 d. C99 (8 Points)**

a) 0000 1000 1010 1001
b) 0000 1101 1100 1011
c) 0000 1010 0000 0001
d) 0000 1010 1001 1001

A-10
B-11
C-12
D-13
E-14
F-15

**Question 3:** What is the value of the least significant bit in the bit patterns represented by the following hexadecimal notations?
**a. 9A b. 90 c. 1B d. 6E (8 Points)**

a) 0000 0000 1001 1010 L.S.B = 0
b) 0000 0000 1001 0000 L.S.B = 0
c) 0000 0000 0001 1011 L.S.B = 1
d) 0000 0000 0110 1110 L.S.B = 0

**Question 4:** Convert each of the following base 10 representations to its equivalent excess sixteen representation:
**a.-12 b.0 c.10 d. -8 (8 Points)**

a) 0000 0000 0000 1100 = 12
1111 1111 1111 0011 = one's comp.
+ 1
1111 1111 1111 1100 = 0xFFFC

b) 0 = 0x0000

c) 0000 0000 0000 1010 = 0x000A

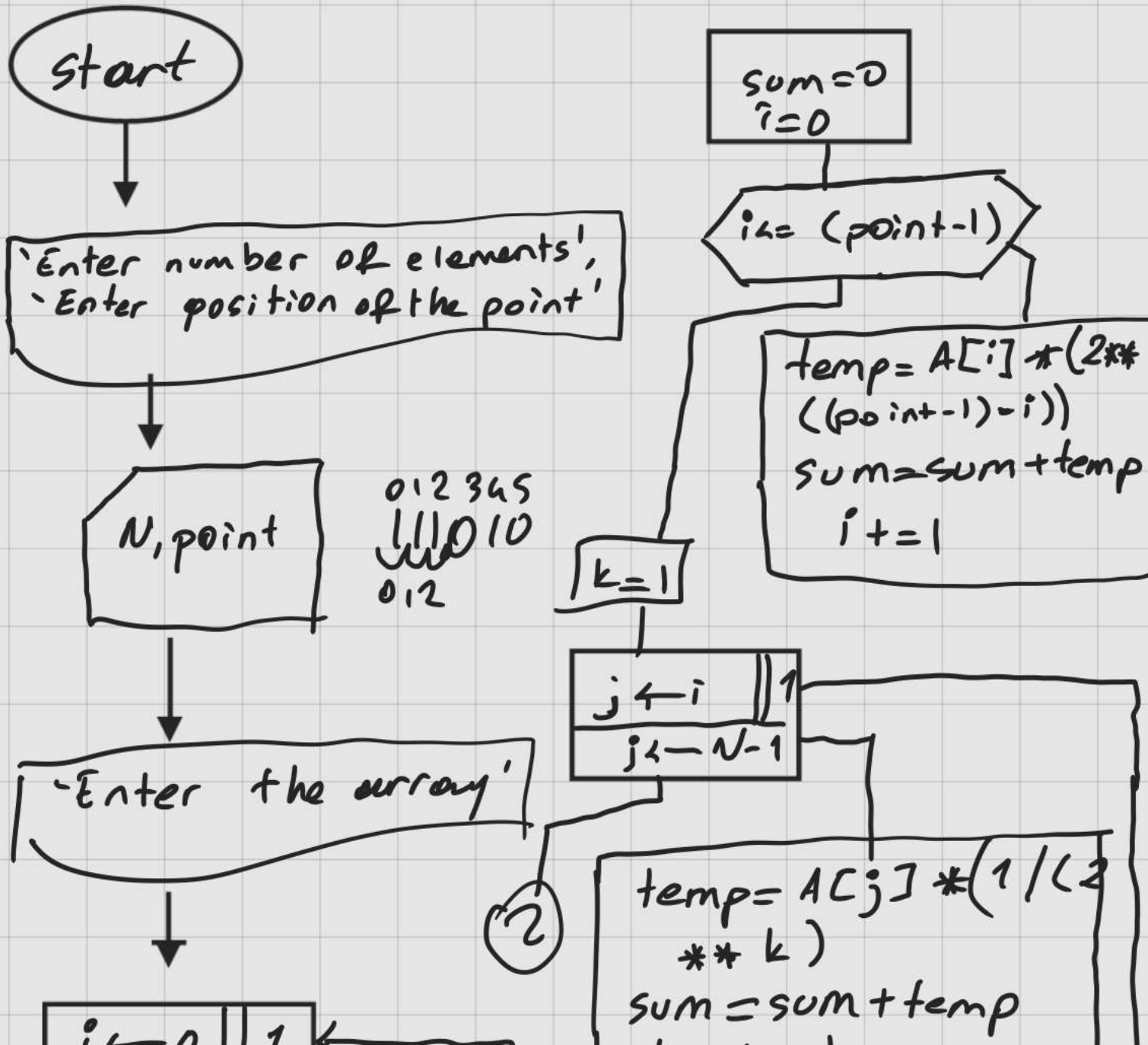
d) 0000 0000 0000 1000 = 8

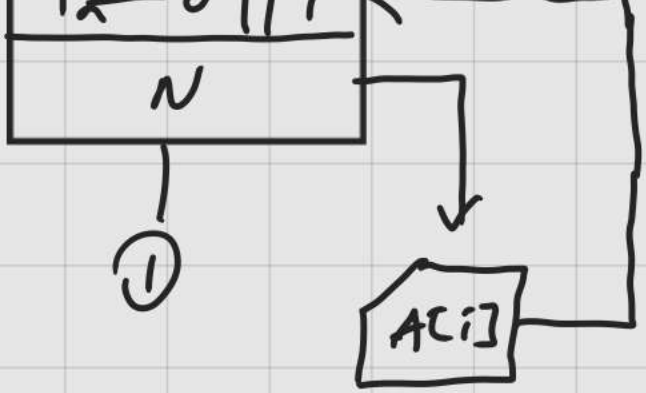
\+ 1111 1111 1111 0111

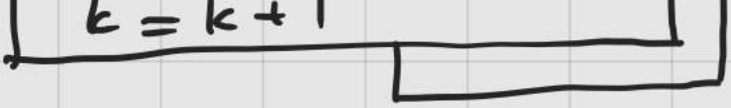
1111 1111 1111 1000 = 0xfff8

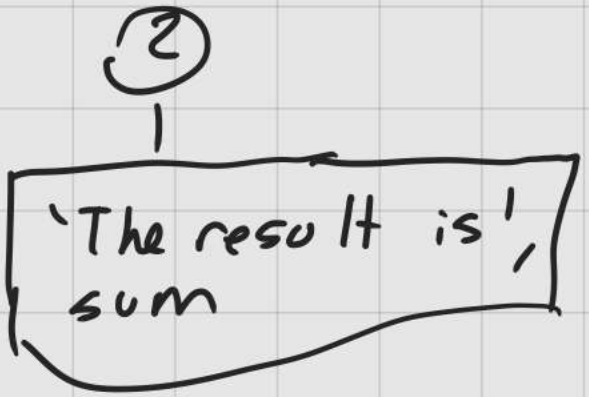
**Algorithm 1:** **Design an algorithm** which converts the given zeros and ones into a fractional number (use base 10 representation) using the given point position? **(70 Points)**

**Input (should be given by the user) :**
**N** : the number of elements of the given array
**Array**: consists of zeros and ones
**Point**: the position of the point






## Analysis

| N | point | sum | i | temp | j | k | array |
|---|---|---|---|---|---|---|---|
| 6 | 3 | 0 | 0 | — | - | — | 111010 |
| 6 | 3 | 4 | 1 | 1*(2^2)=4 | — | — | 0,1,2,3,4,5 |
| 6 | 3 | 6 | 2 | 1*(2^1)=2 | — | — | |
| 6 | 3 | 7 | 3 | 1*(2^0)=1 | 3 | 1 | |
| | | 7 | | 0*(1/(2*1))=0 | 4 | 2 | |
| | | 7.25 | | 1*(1/(2*2))=0.25 | 5 | 3 | |
| | | 7.25 | | 0*(1/(2^3))=0 | | | |

| N | point | sum | i | temp | j | k | array |
|---|---|---|---|---|---|---|---|
| 5 | 2 | 0 | 0 | 1*(2^1)=2 | — | — | 10011 |
| | | 2 | 1 | 0*(2^0)=0 | — | — | 0,1,2,3,4 |
| | | 2 | 2 | 0*(1/2^1)=0 | 2 | 1 | |
| | | 2 | — | 1*(1/2^2)=0.25 | 3 | 2 | |
| | | 2.25 | — | 1*(1/2^3)=0.125 | 4 | 3 | |
| | | 2.375 | | | | | |

$$10.011 = 2 + 2^{-2} + 2^{-3} = 2.375$$

Sonuç 2.675 denmiş ama hatalı yazılmış sanırım.

| N | point | sum | i | temp | j | k | array |
|---|---|---|---|---|---|---|---|
| 4 | 1 | 0 | 0 | 1*2^1=1 | - | — | 1100 |
| | | 1 | 1 | 1*1/2^1=0.5 | 1 | 1 | |

1.5 — 0*1/2^2=0 2 2
1.5 — 0*1/2^3=0 3 3

4 | 1.5 |

| N | point | sum | i | temp | j | k | array |
|---|---|---|---|---|---|---|---|
| 3 | 2 | 0 | 0 | 0*(2^0)=0 | — | - | 0 1 0 |
| | | 0 | 1 | 1*(2^1)=1 | - | | |
| | | | | 0*(1/2^1)=0 | 1 | 1 | |

☆ | 1 |