

Question 1: Suppose a digital camera has a storage capacity of 500MB. How many black-and-white photographs 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)

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

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

$$4 \times 10^{23} / 2^{18} = 4 \times 10^5 = 400,000 \text{ photographs}$$

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	A - 10
b)	0000	1101	1100	1011	B - 11
c)	0000	1010	0000	0001	C - 12
d)	0000	1010	1001	1001	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)
$$\begin{array}{cccc} 0000 & 0000 & 0000 & 1100 \\ 1111 & 1111 & 1111 & 0011 \end{array} = 12$$

$$\begin{array}{cccc} 1111 & 1111 & 1111 & 1100 \end{array} = 0x \text{FFFC}$$

b) $0 = 0 \times 0000$

c) $0000 \ 0000 \ 0000 \ 1010 = 0 \times 000A$

d) $0000 \ 0000 \ 0000 \ 1000 = 8$
 $+ \begin{array}{cccc} 1111 & 1111 & 1111 & 0111 \\ \hline 1111 & 1111 & 1111 & 1000 \end{array} = 0 \times fff8$

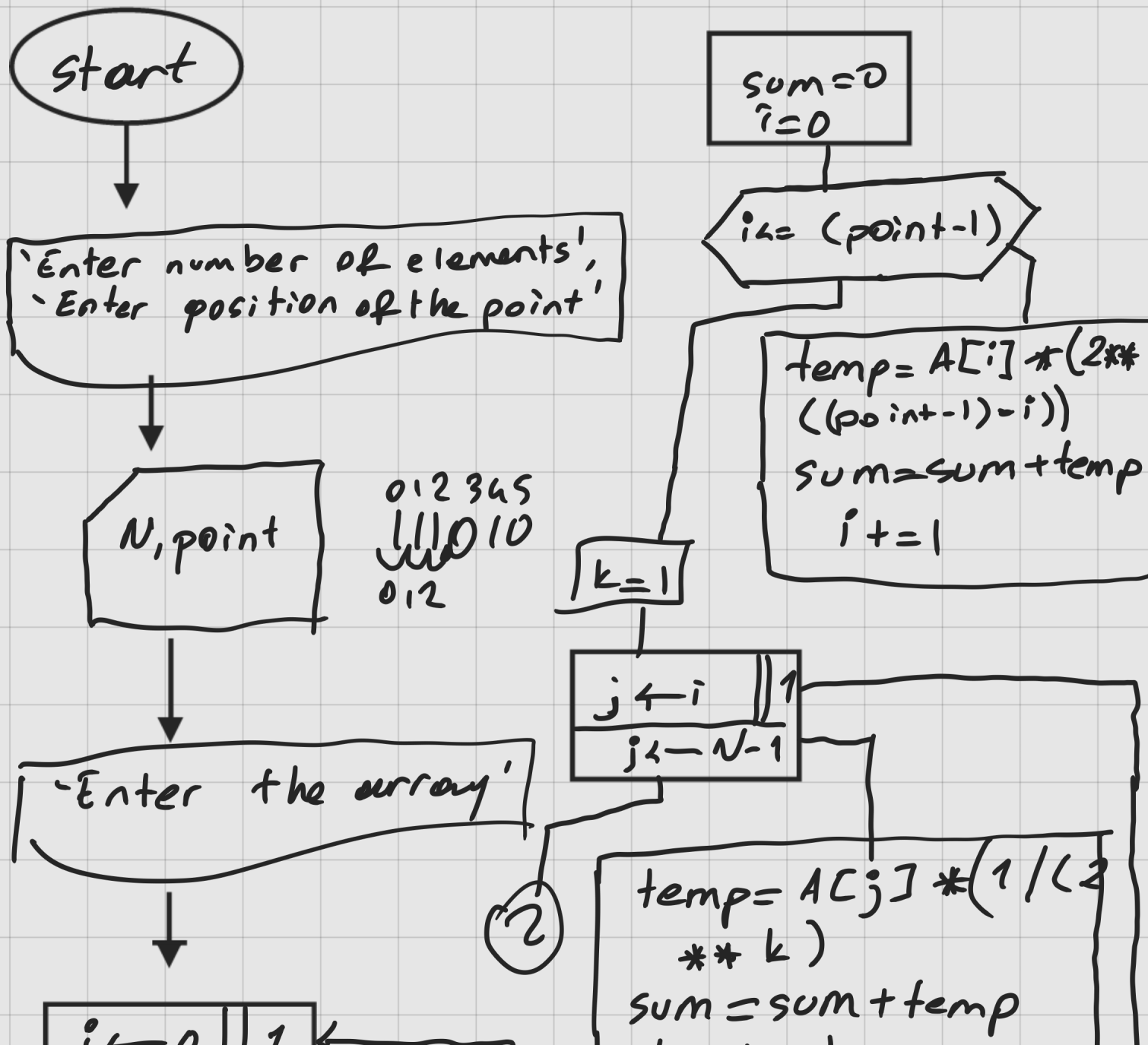
Algorithm 1: Design an algorithm which converts the given zeros and ones into a fractional number (use base 10 representation) using the given point position? (70 Points)

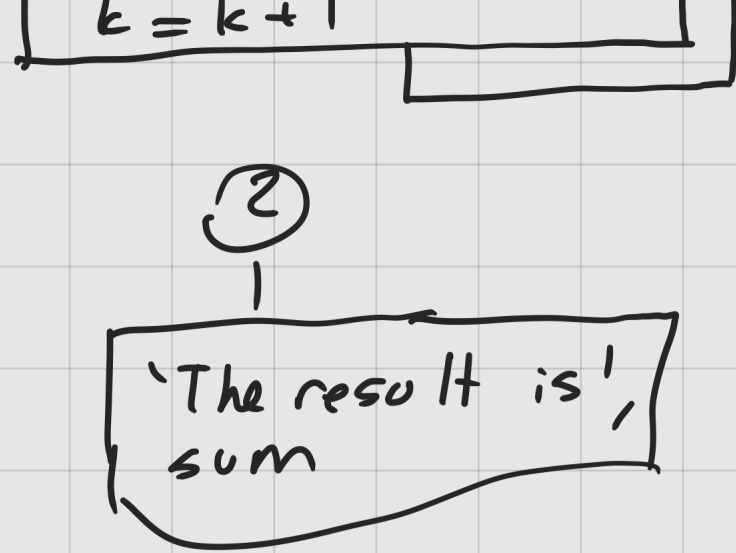
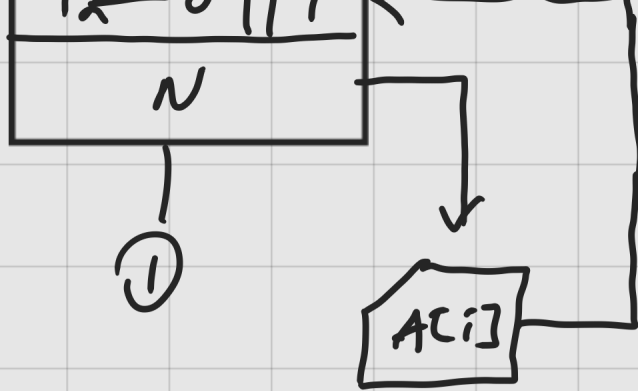
Input (should be given by the user) :

N : the number of elements of the given array

Array: consists of zeros and ones

Point: the position of the point





Analysis

<u>N</u>	<u>point</u>	<u>sum</u>	<u>i</u>	<u>temp</u>	<u>j</u>	<u>k</u>	<u>array</u>
6	3	0	0	—	—	—	111010
6	3	4	1	$1 * (2 \wedge 2) = 4$	—	—	0, 2, 3, 4, 5
6	3	6	2	$1 * (2 \wedge 1) = 2$	—	—	
6	3	7	3	$1 * (2 \wedge 0) = 1$	3	1	
		7		$0 * (1 / (2 \wedge 1)) = 0$	4	2	
		7.25		$1 * (1 / (2 \wedge 2)) = 0.25$	5	3	
		7.25		$0 * (1 / (2 \wedge 3)) = 0$			

<u>N</u>	<u>point</u>	<u>sum</u>	<u>i</u>	<u>temp</u>	<u>j</u>	<u>k</u>	<u>array</u>
5	2	0	0	$1 * (2 \wedge 1) = 2$	—	—	10011
		2	1	$0 * (2 \wedge 0) = 0$	—	—	0, 1, 2, 3, 4
		2	2	$0 * (1 / 2 \wedge 1) = 0$	2	1	
		2	—	$1 * (1 / 2 \wedge 2) = 0.25$	3	2	
		2.25	—	$1 * (1 / 2 \wedge 3) = 0.125$	4	3	
		2.375					

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

Sonuç 2.675 denmiş ama hatalı yazılmış sanırım.

<u>N</u>	<u>point</u>	<u>sum</u>	<u>i</u>	<u>temp</u>	<u>j</u>	<u>k</u>	<u>array</u>
4	1	0	0	$1 * 2 \wedge 1 = 1$	—	—	1100
		1	1	$1 * 1 / 2 \wedge 1 = 0.5$	1	1	

$$\begin{array}{rcl}
 1.5 & - & 0 * 1/2 + 2 = 0 \quad 2 \\
 1.5 & - & 0 * 1/2 + 3 = 0 \quad 3 \\
 \star & \boxed{1.5} &
 \end{array}$$

<u>N</u>	<u>point</u>	<u>sum</u>	<u>i</u>	<u>temp</u>	<u>j</u>	<u>k</u>	<u>array</u>
3	2	0	0	$0 * (2 + 2) = 0$	-	-	010
		0	1	$1 * (2 + 1) = 1$	-		
		$\star \boxed{1}$		$0 * (1/2 + 1) = 0$	1	1	