1)

a) If we use the equation raisedBase= raisedBase + raisedBase, then the total number of operations to compute raisedBase would be the initial operation to assign raisedBase = 1 and the number of times the operation raisedBase= raisedBase + raisedBase is performed. From our solution, we know that this operation is performed will be performed every time the loop repeats. As the length of deathBin is 10, the loop will repeat 10 times. Thus the total number of operation to compute raisedBase from the start of the algorithm to the end is 1 + 10 = **11 operations.**

b) If we use exponents, then for each bit 2 will be multiplied by itself **i** times where **i** represent the location of the bit. For example, for the 5th bit, 2 will be multiplied by itself 5 times. Please note that raisedBase = 1 will not be counted as an operation as there is no need to initialize the variable if we are using exponents is each case. Thus the total number of operations will be:

Number of operations on individual bit:

$2^0 = 1$

$2^1 = 1$

$2^2 = 1$ as 2*2

$2^3 = 2$ as 2*2*2

$2^4 = 3$ as 2*2*2*2

$2^5 = 4$ as 2*2*2*2*2

$2^6 = 5$ as 2*2*2*2*2*2

etc. until 2^9.

Total number of operations= 1+1+1+2+3+4+5+6+7+8

= **38 operations**

We can create an equation in order to find the number of operations in this situation. If we notice the pattern, from i=3 onwards, the number of operations increases by 1. Therefore, the formula to calculate the number of operations can be:

Operations= (2+3+4+…(n-2)) + 3 where n is the number of bits

c) As we mentioned in part a, if we used the equation raisedBase= raisedBase + raisedBase to compute the raisedBase, the total number of operation will be the number of times the loop repeats (also the number of bits) + 1. Thus for a 64-bit binary number, the total number of operations would be 64 + 1= **65 operations**.

d) In order to get the number of operations, we can use a similar approach to part b. If we use the formula created in part b with a 64-bit number, we get the number of operations is:

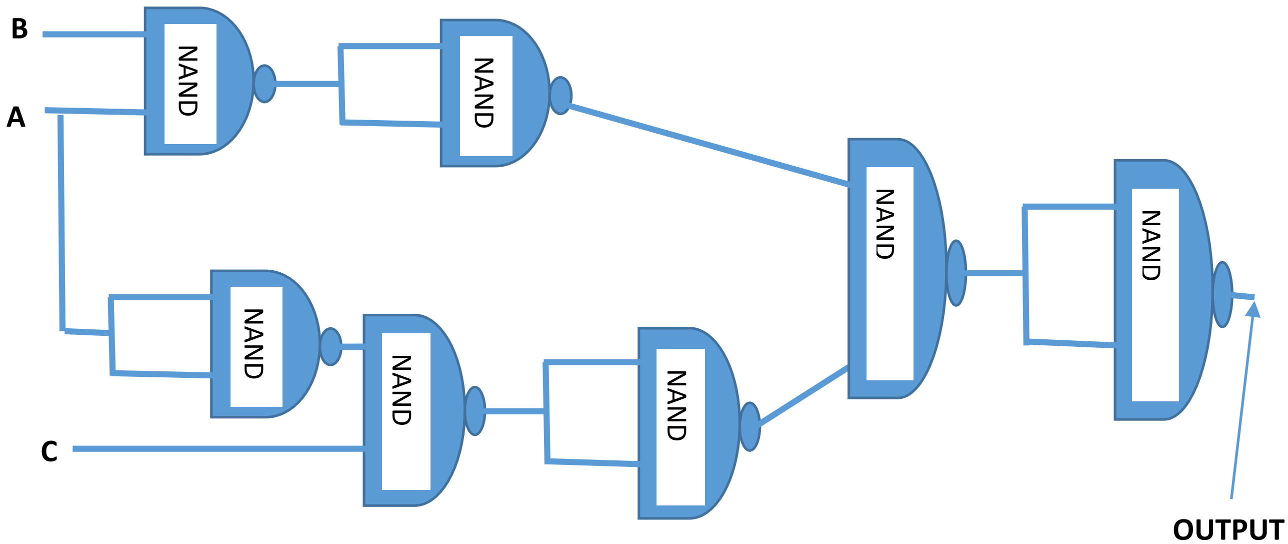
Operations = (2+3+4+…+62) + 3

= 1952 + 3 sum from 2 to 62= 1952

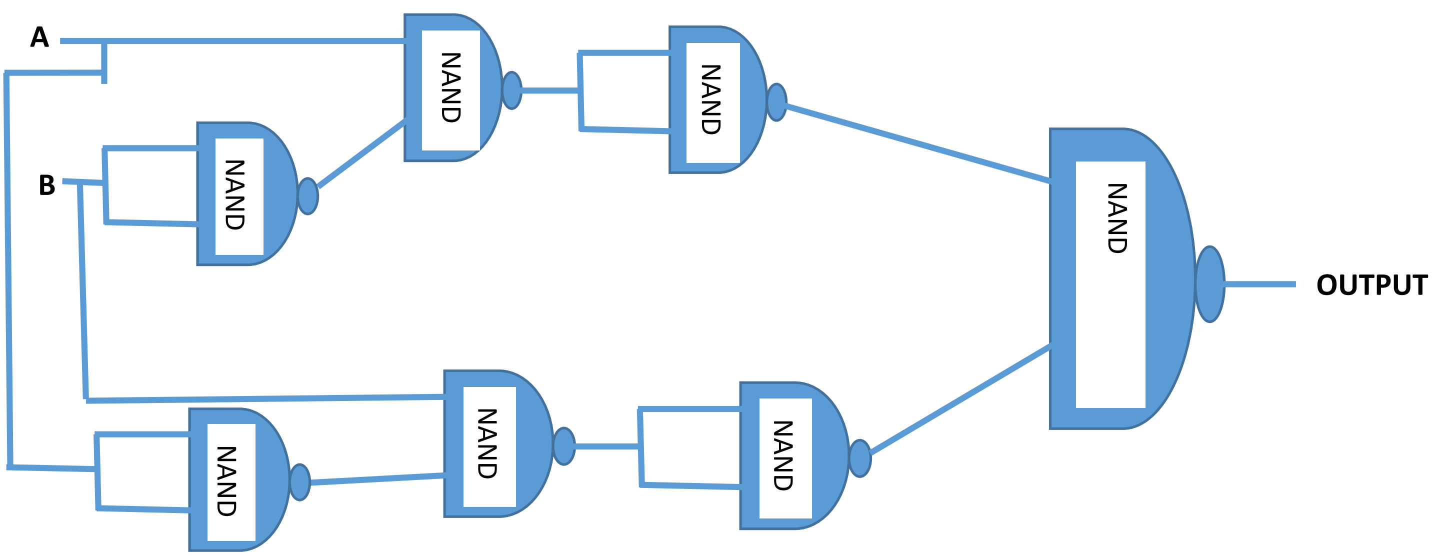
= **1955 operations**

2)

a)



b)



Question 3 on next page

3)

a) The output will be:

“swapping A = [1,6,6,8,3,4]
swapping A = [2,6,6,8,8,4]
A = [3,6,6,8,8,4]”

b) The output will be:

“[1,6,2,8,3,4]
swapping A = [1,2,6,8,3,4]
A = [1,2,6,8,3,4]
swapping A = [1,2,3,6,8,4]
A = [1,2,3,6,8,4]
swapping A = [1,2,3,4,6,8]
A = [1,2,3,4,6,8]
A = [1,2,3,4,6,8]
A = [1,2,3,4,6,8]”