CCC2113 Data Structures and Algorithms Analysis **Name**:

Lab 9: Tree & Queue (13/6/2024) **Group**:

a) Find the number of nodes in a full binary tree of height 6 **Answer**: 127

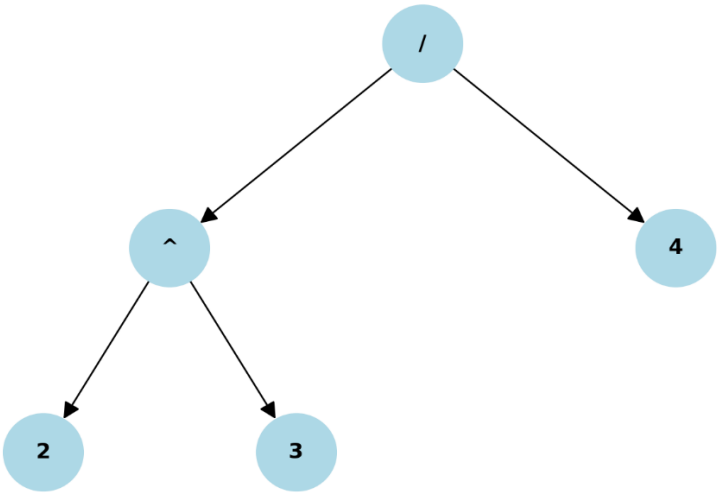
$$N = 2^{(6+1)} - 1$$
$$N = 2^7 - 1$$
$$N = 128 - 1$$
$$N = 127$$

b) Find the minimum height of a binary tree with 31 nodes **Answer**: 4

$$h = \lfloor \log_2(N) \rfloor$$

$$h = \lfloor \log_2(31) \rfloor$$

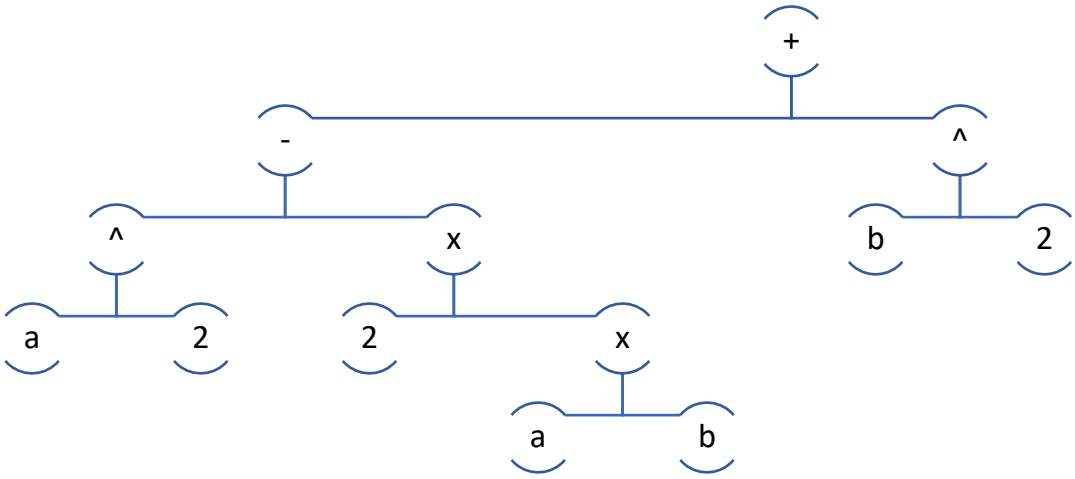
c) Find the mathematical expression represented in the following tree:



Answer: (2^3)/4

d) Build an expression tree (assuming in-order / infix traversal) for:

$$a^2 - 2ab + b^2$$



e) Imagine you have a queue of books arranged in descending order of their author's name. Describe a process to transfer all the books to an empty queue, ensuring that the books in the new queue is an ascending order of their author's name.

Step 1: create an empty stack and queue2.

Step 2: Dequeue books from queue1 and push them onto stack, ensuring books in stack are sorted in ascending order of author names by comparing and adjusting positions as necessary with books in queue1.

Step 3: Pop books from stack and enqueue them into queue2. Since stack holds books in ascending order after sorting, directly enqueueing maintains the sorted order in queue2.