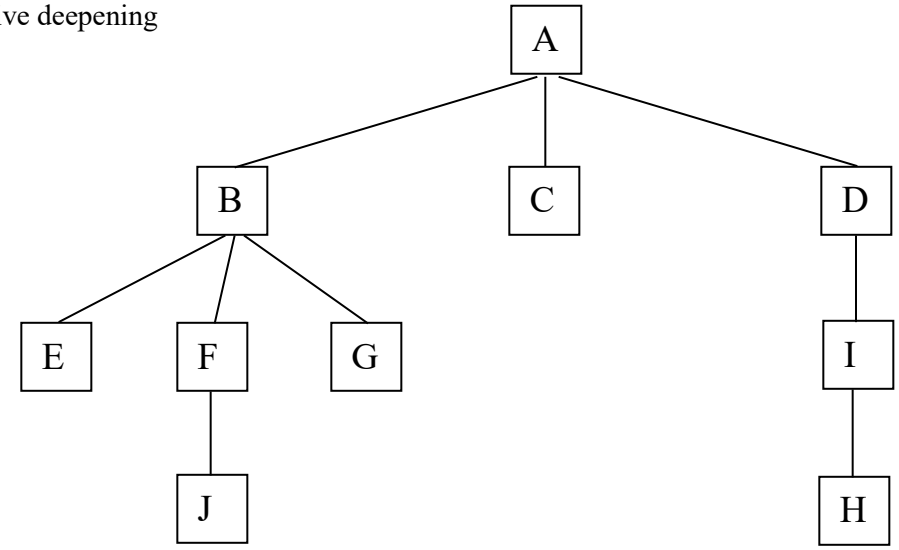
Name: **Student ID**

1) In what order would the following algorithms visit the nodes of the search tree below? You can assume that all operators have the same cost. (For clarity, "visit" means *dequeue* from the queuing structure). Hint, for one of these algorithms, we would dequeue 'A" more than once.

A) Breadth first search
B) Depth first search
C) Iterative deepening



A)_____

B)_____

C)_____

2) Suppose we need to optimally solve a problem using blind search, for which the goal node is known to be at a depth of *exactly* 17 (i.e. $d = 17$). What algorithm would you use, and why?

3) Suppose we need to optimally solve a problem using blind search, for which the goal node is known to be at a depth *of no more than* 29 (i.e. $d <= 29$). What algorithm would you use, and why?

4) What is the *diameter* of a search problem? You could answer with a single English sentence.

5) What is the diameter of the **countdown numbers game**? (in general, not just the game I show below as an example). Justify your answer with two or three English sentences,
https://www.youtube.com/watch?v=_JQYYz92-Uk&ab_channel=RussellBabidge

6) Explain the difference between *optimality* and *completeness* for search (one or two sentences)

7) Suppose we are trying to solve the *Ballyfermot-by-Bike* problem. The branching factor is 17, the only solution is known to be at depth 22. You solve it two ways, Breadth First Search and Iterative Deepening.

- What was the greatest number of nodes in the queue when doing Breadth First Search?
- What was the greatest number of nodes in the queue when doing Iterative Deepening?

I don't need an exact answer, I would accept something like…

"About (sin(17) * tan(22-17))^(22-17) which is about 362.", or

"About O(log(log(d*b))*d) which here is O(log(log(22*17)) *22), which is about 40."