Exercise 1

Three goats and three wolves are on the same side of a river. There is only one boat that can carry at most two animals from one side of river to the other at a time. If at any time there are more wolves than goats on the same side of the river, the goats will be eaten by the wolves. Is it possible to transport all the goats and wolves to the other side of the river without anything getting eaten ? Note that the boat cannot cross if it is empty.

Exercise 2

```
1  function Graph Search returns a solution or failure
2     initialise the frontier with initial state
3     initialise the explored set with ∅
4       do
5         if the frontier is empty
6           then return failure
7         else
8           choose a node n and remove it from the frontier
9           if n is a goal state
10            then return n
11          else
12            add n to the explored set
13            for each successor s of node n
14              if s is not in the frontier or explored set
15                add s in the frontier
```

Using the pseudo code for `Graph Search` as a starting point, write pseudo code for :

— breadth first search

— depth first search

Exercise 3

Consider a search tree with the following parameters :

- b branching factor of the tree
- d is the depth of the shallowest solution
- m is the maximal depth of the search tree
- l is the maximal depth of a depth-limited search

Complete the following table. Justify your answers.

	BFS	DFS	Depth-limited	Iterative-deepening	Bidirectional
complete ?	✔ ? ✘	✔ ? ✘	✔ ? ✘	✔ ? ✘	✔ ? ✘
time complexity	$\mathcal{O}(?)$	$\mathcal{O}(?)$	$\mathcal{O}(?)$	$\mathcal{O}(?)$	$\mathcal{O}(?)$
memory complexity	$\mathcal{O}(?)$	$\mathcal{O}(?)$	$\mathcal{O}(?)$	$\mathcal{O}(?)$	$\mathcal{O}(?)$
optimal ?	✔ ? ✘	✔ ? ✘	✔ ? ✘	✔ ? ✘	✔ ? ✘