Tutorial ①.

① Write down the difference between an array and the structures.

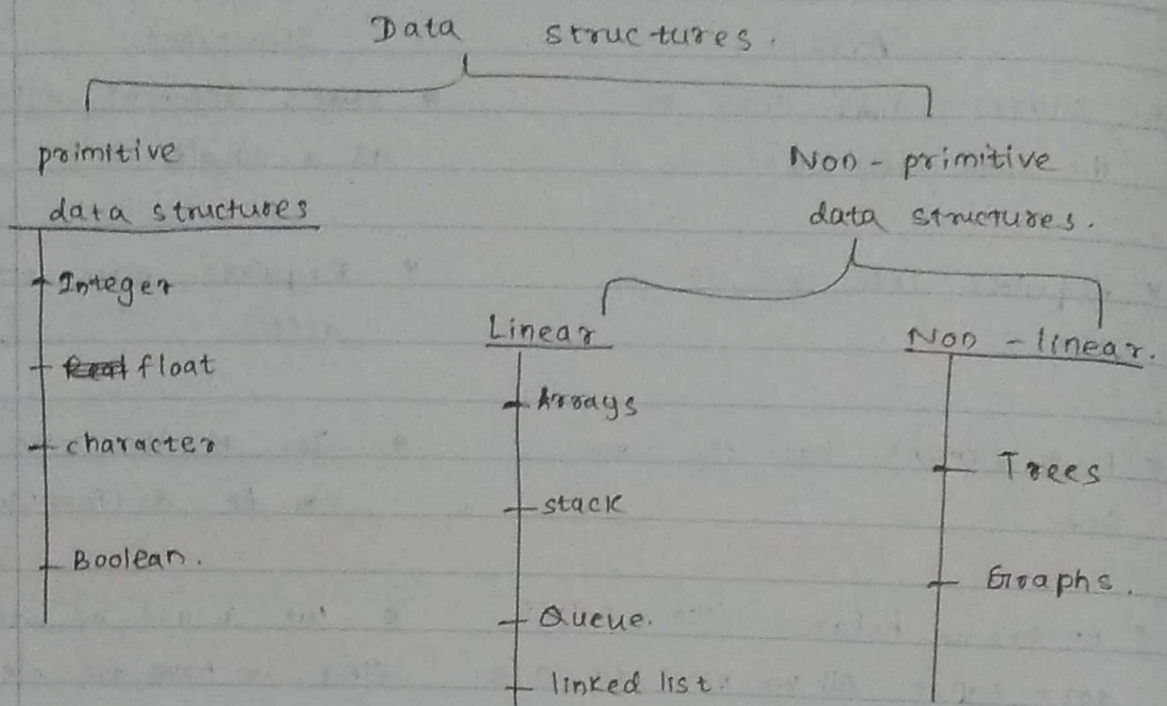| Arrays	Structures.
* Stores data sets of the same data type.	* Stores different data types as a single unit.
* Requires less time to access	* Requires more time to access.
* Each element has the same Size.	* Size of the elements can be different.
* An array behaves like a built-in data types. All we have to do is to declare an array variable and use it.	* But incase of structures, first we have to design and declare a data structure before the variable of that type are declared and used
* Array is a pointer to the first element of it.	* Structure is not a pointer
* Array allocates static memory. Uses index / subscript for accessing elements of the array	* Structures allocate dynami memory. Uses (.) operator for accessing the memory structure.

② Where should you use data structures

* Data structures are used for efficient data persistence, such as specifying the collection of attributes and corresponding structures used to store records in a database management system.
Ex:- storing data, Managing resources and services, data exchang ordering and sorting, indexing, searching, scalability etc.

③ What are the types of data structures.

```
                    Data      structures.
          ┌───────────────────┴────────────────────┐
    primitive                              Non - primitive
    data structures                        data structures.
    ┌                                       ┌──────────┴──────────┐
    ├ Integer                          Linear               Non - linear.
    │                                  │                     │
    ├ Real float                       ├ Arrays              │
    │                                  │                     ├ Trees
    ├ character                        ├ stack               │
    │                                  │                     │
    │                                  │                     ├ Graphs.
    └ Boolean.                         ├ Queue.
                                       │
                                       └ linked list.
```

④ What is a linked-list data structure.

* A linked list is a linear data structure that stores a collection of data elements dynamically.

* Nodes represent those data elements, and links or pointers connect each node.

* Each node consists of two fields, the information stored in a linked list and a pointer that stores the address of its next node.

* The last node contains null in its second field because it will point to no node.

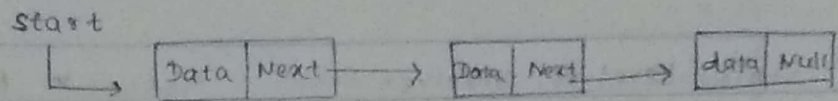* A linked list can grow and shrink its size as per the requirement.

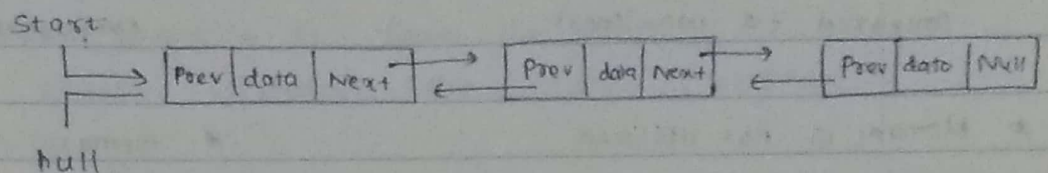* It doesnot waste memory space.

Representation of a linked - list

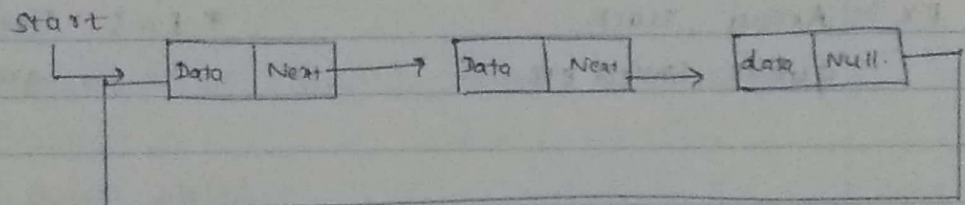
Node
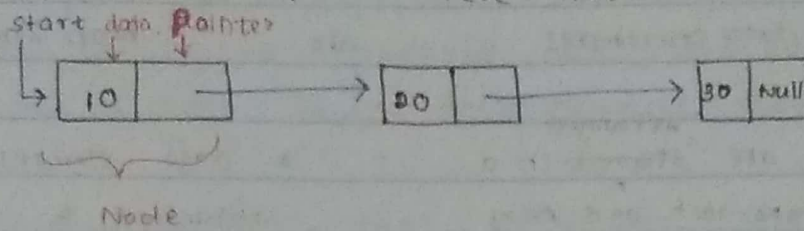
* Links can be single, Double or circular.

single.

Double

null

Circular.

(5) What is the recursive data structure.

* A data structure that is partially composed of smaller or simpler instances of the same data structures.

Ex:- Linked-lists
Binary trees.

* The process of a function calling itself directly or indirectly to solve a problem.

⑥ Compare and contrast linear and non-linear data structures

Linear data structures   Vs.   (Binary and others) Non-Linear

* Data elements are ~~stored~~ arranged in a linear order where each and every element is attached to its previous and the next adjacent.

* Single level is involved.

* Simple implementations compared to non-linear.

* Memory is not utilized in an efficient way.

* Ex :- Array, stack, queue, linked etc.

* data elements are attached in hierarchically manner.

* Mutiple levels are involved.

* Complex implementations. compared to linears.

* memory is utilized in an utilized in an efficient way.

* Ex ; Trees graphs