**Homework lecture 1**

**Sort**

1. Given a list of integer numbers: 2, 1, 10, 6, 3, 8, 7, 13, 20. Draw the steps to sort (ascending sort) the list by following methods:

* Selection sort:
  + Assign min = first element (min = 2)
  + Compare min to 2nd element, 3rd element,... to get min element from 1st to last element (min = 1).
  + Swap min element with 1st element. -> 1, 2, 10, 6, 3, 8, 7, 13, 20
  + Assign min = 2nd element (min = 2)
  + Compare min to 3rd element, 4th element,... to get min element from 2nd to last element (min = 2).
  + Swap min element with 2st element. -> 1, 2, 10, 6, 3, 8, 7, 13, 20
  + Do the same until reach the last element in array.
* Insertion sort:
  + Assign key = 2nd element (key = 1).
  + See that 1 < 2 so insert 1 before 2.
  + Assign key = 3rd element (key = 10).
  + See that 10 > 2 so keep 10 stay same position.
  + Assign key = 4th element (key = 6).
  + See that 6 > 2 but 6 < 10 so insert 6 at position between 2 and 10.
  + Do the same until reach the last element in array.
* Bubble sort:
  + Compare 2 to 1, see that 2 > 1 so swap their position. 1, 2, 10, 6, 3, 8, 7, 13, 20
  + Compare 2 to 10, see that 2 < 10 so keep their position.
  + Compare 10 to 6, see that 10 > 6 so swap their position 1, 2, 6, 10, 3, 8, 7, 13, 20
  + Compare 10 to 3, see that 10 > 3 so swap their position.
  + Compare 10 to 8, see that 10 > 8 so swap their position.
  + ...
  + Compare 10 to 13, see that 10 < 13 so keep their position.
  + Compare 13 to 20, see that 13 < 20 so keep their position.
  + Got 20 is the greatest element in array stay in last position.
  + Do the same until nothing left to compare.
* Merge sort:
  + A blue line drawing on a white background

    Description automatically generated
* Quick sort:
  + 2, 1, 10, 6, 3, 8, 7, 13, (20)
  + (2, 1, 10, 6, 3, 8, 7, (13) ) (20) ()
  + (2, 1, 10, 6, 3, 8, (7) ) (13)
  + (2, 1, 6, (3) ) (10, (8) )
  + (1, (2) ) (6) () (10)
  + (1)
  + 1, 2, 3, 6, 7, 8, 10, 13, 20
* Heap sort:
* A group of lines and dots

  Description automatically generated with medium confidence
* Radix sort: 2, 1, 10, 6, 3, 8, 7, 13, 20
  + Largest element in array is 20, which has 2 digits.
  + Sort array based on unit place:
    - 10, 20, 1, 2, 3, 13, 6, 7, 8
  + Sort array based on tens place:
    - 1, 2, 3, 6, 7, 8, 10, 13, 20
  + Array after sorting:
    - 1, 2, 3, 6, 7, 8, 10, 13, 20