1. The Doc which covers some basic examples (max sub array/ closest pair of points/ karatsuba)

[5. divide and conquer HFN.pdf](https://drive.google.com/file/d/13uXoXn1Vy8A8RHEiZrt_h3OLz3dUOP3_/view?usp=drive_link)

**Doc for searching:** [**Search Algorithms [HFN]**](https://docs.google.com/document/d/1kIId7CmEYATxLu4Uvn9koTBbLYCOFvBMRWSY3KMHZTY/edit?usp=share_link)

1. Books you should follow:
   1. Dasgupta chapter 2 Divide-and-conquer algorithms:[**Dasgupta book**](https://drive.google.com/file/d/1WM6MK72qCfPWrpbxuUgfr9OXvynvfVVH/view?usp=share_link)
   2. Cormen chapter 4 **(this is the reference book for all chapter)**: [**Cormen Algo Book**](https://drive.google.com/file/d/1PuF44Cc7RmzA211phFTaWqiYkgR1r7Rj/view?usp=share_link)

Now going through topics or related examples, you can follow this **youtube videos/playlist/reference** to understand different scenarios of divide and conquer problems:

* **Merge Sort:** [**merge sort**](https://www.youtube.com/watch?v=TzeBrDU-JaY&t=398s)**,** [**Time complexity merge sort**](https://www.youtube.com/watch?v=0nlPxaC2lTw&t=642s)**.**
* **Quick Sort:** [**Quick Sort**](https://www.youtube.com/watch?v=COk73cpQbFQ)**,** [**Time complexity quick sort**](https://www.youtube.com/watch?v=3Bbm3Prd5Fo&t=1073s).
* **Binary Search:** {you can see this playlist if you want, not needed if you already know how to implement it properly} [Binary Search Playlist](https://www.youtube.com/playlist?list=PL2_aWCzGMAwL3ldWlrii6YeLszojgH77j).
* **Closest pair of points:** [**graphic demonstration**](https://www.youtube.com/watch?v=6u_hWxbOc7E&list=LL&index=21)**,** [Stanford Lecture Part 1](https://www.youtube.com/watch?v=3pUOv_ocJyA&list=PLXFMmlk03Dt7Q0xr1PIAriY5623cKiH7V&index=18), [Stanford Lecture Part 2](https://www.youtube.com/watch?v=7tiafUFrlBw&list=PLXFMmlk03Dt7Q0xr1PIAriY5623cKiH7V&index=19&t=681s). {just try to understand the basic logic and algorithmic decisions made to solve the problem and time complexity analysis}.
* **Max Subarray Sum:** [**Max subarray sum**](https://www.youtube.com/watch?v=ohHWQf1HDfU&t=681s)**,** [solution lecture](https://personal.utdallas.edu/~daescu/maxsa.pdf){There is a faster solution which is not included since it’s not under divide and conquer; the name of the algo is Kadane's Algorithm}
* **Karatsuba**: check the notes shared at the top /any videos you like. [**Karatsuba demonstration**](https://www.youtube.com/watch?v=yWI2K4jOjFQ)
* **Matrix Multiplication:** Check the books given above {**Strassen’s Algorithm**}
* Also, check the problems given in lab: **Inversion Count, Pair finding problem, Quick Select (Kth smallest element)**; you can use however method seems fit to learn.

Note, optional studies are those which were not discussed in class (except the matrix multiplication) and they are marked in orange color. Greens are mandatory. You can follow the bux slides if you want which are given in the folder as well.