ADA notes MIT OCW

Intractibility NP problems: Class of problems verifiable in polynomial time. Example: Hamiltonian path (Given a cycle we can check that it contains all vertices in polynomial time)

NP complete: Example: Finding a hamiltonian cycle. Hardest of NP. If solved all NPcan be easily solved. Definition: Problem is in NP and is as difficult as any probleem in NP

Some examples of NP complete: Interval Scheduling Single resource multiple requests Select a compatible subset of requests that is of maximum size

ALGORITHM: Job Scheduling so that maximum jobs are taken: Pseudocode: Take the job with minimum finish time:

ALGORITHM: Weighted interval scheduling Jobs are given a weight; Use DP Recurrence : OPT = (for i = 1 to i=n)MAX(Weight(i) + OPT(Fx)) Note: Sort first by end times Fx is the set of all weights with finish times greater than current weight For all different weights try each weight as a possible first weight and take maximum Time complexity = O(n*n) simple O(n*lgn) using binary search // binary heap

Divide and Conquer:

T(n) = aT(n/b) + work done in merge

ALGORITHM: Convex Hull Brute force in O(n3)

Divide and Conquer approach: Two finger algorithm for merge TO DO ———————— Graham Scan: TO DO———————— ALGORITHM: Define rank of an element: Rank(x) = number of elements in set that are ¡= x Median find: Find the element with rank $\lceil x \rceil$

Divide and conquer algorithm. Select an element x and then divide the set into two sets B and C such that all B has all elements which are less than x and C has all element