Wednesday, Jan 25, 2023) Lecture #4 \bigcirc MSSC 6000 Topiz 3- Greedy Algorithms A lot of topics in this course fall under the category of "problem solving paradigms" "heuristics" What is a problem? You have some input data and/or constraints. Question: Is it possible to satisfy all of the constraints? Ex: Every year the NFL has to come up with a season schedule. A lot of constraints: -17 game in a season - 32 teams aplit into two conferences - Each conference is aplit into 4 divisions Each team plans: Each team plays: * 3 division rivels, twize each (1H/1A) * each of the 4 teams in some other division in the same conf. (2H/2A)

* four teams in the other cart. (EH/2A) * two more teams in their conf (IH),A) * one extra team in other conference Constraints: stadiums TV constraints tons more Q: Can these constraints be satisfied? (Obviously yes) NFL: 10005 of computers They generate ~1000 schedules. Humans pick from those. Another type of question: Which solution is optimal? (lowest cost, highest profit, etc.) Ex: If Amazon has 100 packages to deliver to different house in Milwaukee, and has 5 delivery vons, which route - uses the least gas? - travels the fewest miles? - takes the least time?

Greedy Algorithms Vague Definition: A greedy algo. is a way of solving a public that builds up a solution bit by bit, always picking the next "bit" that is the best, even if it leads to a suboptimal solution. - normally lightning fast - much better than rendom They are: solutions - sometimes pretty bod, sometimes pretty goud, and for some problems they're optimal Exi Gwing change How does a cashier give change? Suppose you one \$3.27 and pay with \$20 \$20-\$3.27 = \$16.73