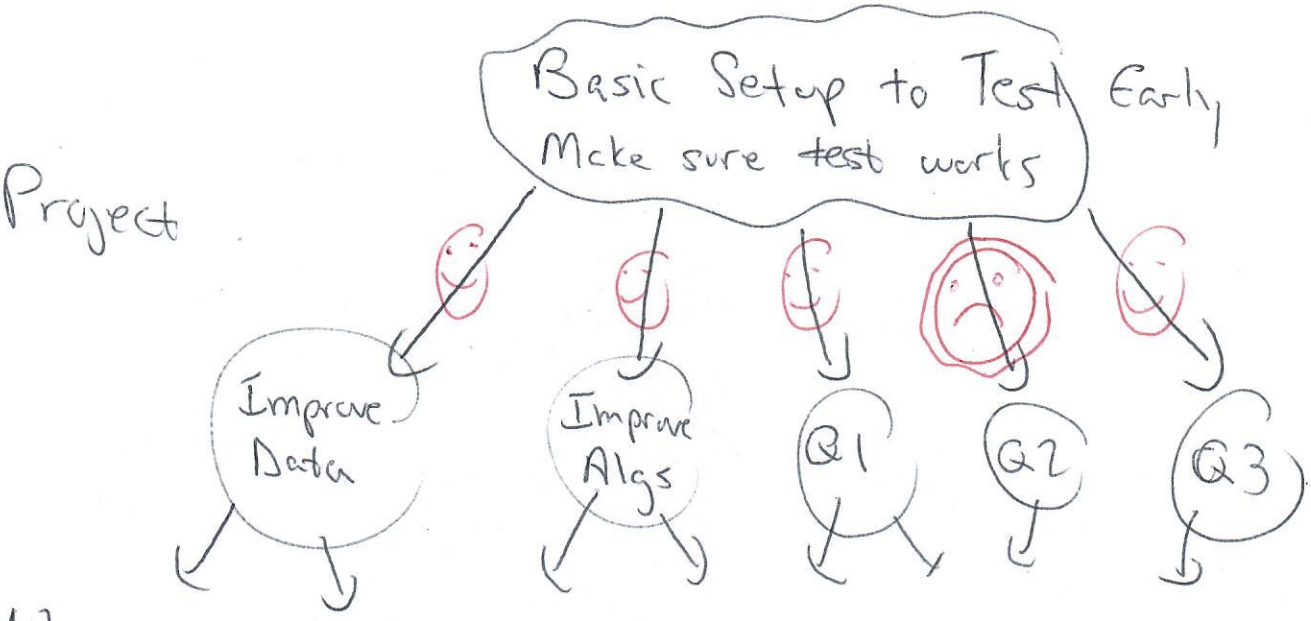
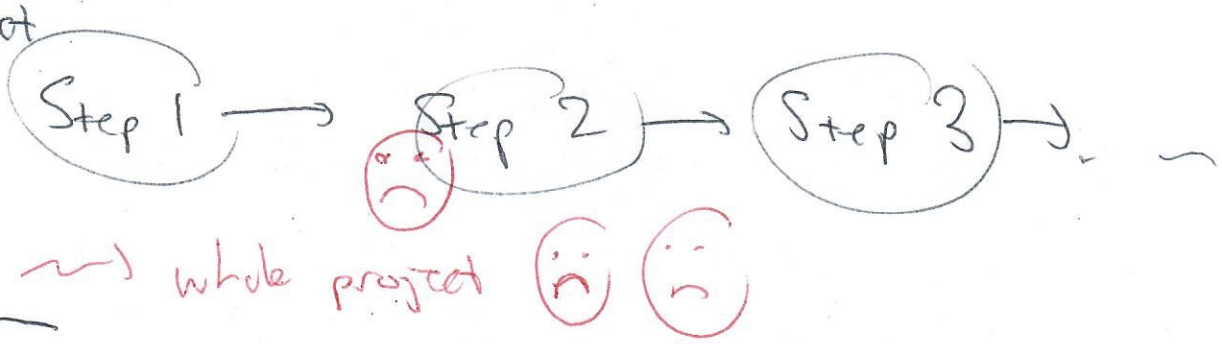
General Remarks:



Not



Data: Modeling Scheduling — 30 sports teams, 3000 students

Easily obtained, but too much ⇝ much smaller, representative sample at first

" " small data set, ⇝ eventually { find larger sets; generate synthetic data

A lot of good ideas:

compare cost vs time in travel

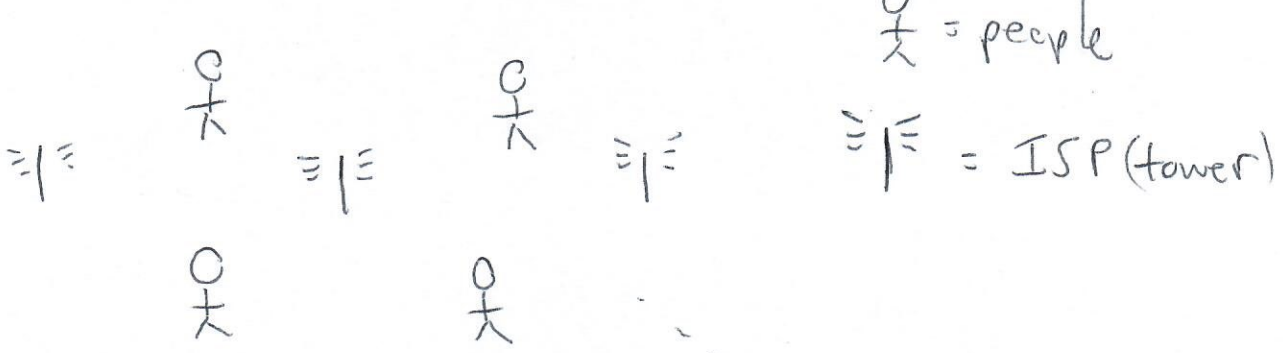
vegetarian utility to other utility in diet

Rather than solve utility 1 versus utility 2, try some combo, or add utility 3 = {extreme event}

utility = some combo of { utility 1
" 2
" 3

=

Example: For next homework:



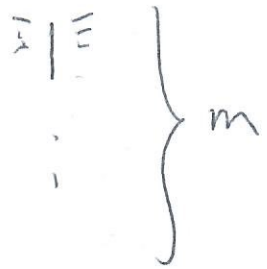
City

Cost service provider: cost to ~~space~~ rent space = utility 1

cost of tech = serving 1 person ↔ 1 unit cost
" 2 " ↔ 4 units total

People

Towers



$X_{ij} = \begin{cases} 1 & \text{if person } i \text{ is served by tower } j \\ 0 & \text{otherwise} \end{cases}$

We have constraints

- each person connected to one tower:

for each i: $X_{i1} + X_{i2} + X_{i3} + \dots + X_{im} = 1$

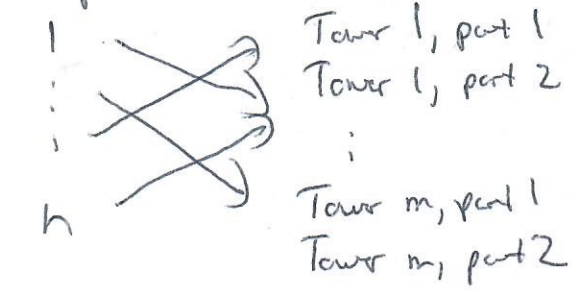
maybe: towers $1, \dots, m$, each tower serves as many people as want, but

cost to tower j: 1 if $X_{1j} + X_{2j} + \dots + X_{nj} = 1$
4 " " $= 2$
7 " " $= 3$
∞ and $X_{1j} + \dots + X_{nj} \leq 3$

In this case

tower j #1 : costs 1 but serves only 1 person
" j #2 : costs 3 " serves as many people as you want

(5)



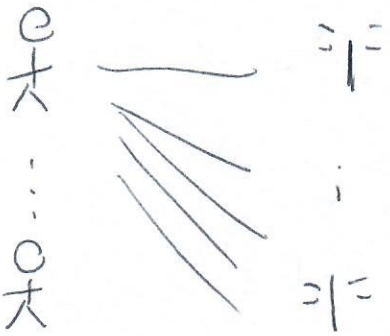
~ ILP, weighted matching problem,

Here cost:

cost serving one person 1
" " each additional 3

part 1, cost 1 per person (limited to only one person)
part 2 cost 3 per person (unlimited)

Alternative (which makes files bigger):



utility 3 related to distance

Written down ILP, theory ⇝ can solve LP relaxations via simplex to solve ILP

We now looked at a sample Gurobi file...