Decision time ...

It's 1pm
You are at the Huddle, and haven't had lunch yet
There is a half-hour line at Subway, your favourite
There is a ten-minute line at Burger King
Lunch (either way) will take you 5 minutes to eat
You have to meet your english TA at Decio, 5 minutes away, at 1.20
That meeting should last 20 minutes
You have a math class in DeBartolo, 5 minutes away, at 1.55
The class begins with a 10 minute quiz
The prof does not allow later comers, but does allow early departures
You have to hand in a physics lab at Nieuwland by 3pm
The write-up is sitting in your dorm room, 15 minutes away.

What do you do?

Alternatives

Any subset of

- Lunch at Subway
- Lunch at BK
- Meet with TA
- Take the quiz
- Stay for the rest of math class
- Hand in lab

But: not every subset is feasible

There are constraints: e.g., can't eat two lunches

can't eat at Subway **and** see TA

Some feasible alternatives

	Subway	**BK**	**TA**	**Quiz**	**rest of class**	**lab**
Alt 1	Y	X	X	Y	Y	X
Alt 2	Y	X	X	Y	X	Y
Alt 3	X	Y	Y	Y	Y	X
Alt 4	X	Y	Y	Y	X	Y
Alt 5	X	Y	X	Y	Y	Y

These are the “maximal” feasible alternatives; e.g.:

	Subway	BK	TA	Quiz	rest of class	lab
Alt 6	X	X	Y	Y	Y	X
Alt 7	Y	X	X	X	X	Y

Alt 3 is better than Alt 6, and Alt 2 is better than Alt 7

Which is best?

It depends ...

- **If** goal is to maximize number of tasks performed, then Alts 3, 4, 5 are equally best
- **If** primary goal is to maximize physics and math grade, and secondarily to get a nice lunch, Alt 2 is best
- **If** points are assigned to each task, as follows:

	Subway	**BK**	**TA**	**Quiz**	**rest of class**	**lab**
Points	4	1	3	5	2	6

  then Alts 2 and 4 (each with 15 points) are best
- **If** ...

The guts of an Operations Research (OR) problem

- A **task** or tasks of some kind to perform
- A large collection of **alternatives**
- A smaller collection of **feasible** alternatives, determined by
- A collection of **constraints**
- Some sense of an **objective**
- A way of **measuring** the feasible alternatives against the objective
- To find an **optimal** feasible alternative

"Solving" an OR problem

- Turn the problem into a mathematical model
  - variables
  - objective function
  - constraints

  This step may involve simplifications
- Solve the mathematical model
  - feasible solution space
  - optimal feasible solution

  This step usually the easiest; algorithmic. It's the focus of this course
- Apply the solution

  In this step, we may expose flaws of the model, and have to start the modeling process again