The Chinese University of Hong Kong

Weeks 7, 8 and 9

The Chinese University of Hong Kong

Let's look at Survey 7

In-class Survey

- Does the following cumulative constraint have an answer?

```
cumulative([0..2,3..5,6,1..5],
    [3,1,1,3], [2,1,3,2], 3)
```

  - A: what the hell is cumulative?
  - B: definitely has a solution
  - C: probably has a solution
  - D: probably doesn't have a solution
  - E: definitely has no solutions

In-class Survey

- Does the following cumulative constraint have an answer?

```
cumulative([0..5,0..5,6,0..5,0..5],
    [3,1,1,3,1], [2,1,3,2,2], 3)
```

  - A: what the hell is cumulative?
  - B: definitely has a solution
  - C: probably has a solution
  - D: probably doesn't have a solution
  - E: definitely has no solutions

Exam Study Scheduling

- You have to devise an exam study schedule.
  - There are *D* study days of *H* (even) hours each before the exam; each day split into equal AM & PM halves
  - There are *n* topics to study, each with a required number of hours
  - Some topics must be finished before others can start
  - On days in *HALF*, the last *H* div 2 hours are not available (topic must be finished before)
  - Some topics must be started *first* thing in the morning (when you are freshest)
  - Devise a schedule that starts as late as possible

Exam Study Scheduling Data

```
int: n;
set of int: TOPIC = 1..n;
array[TOPIC] of int: hours;
int: m;                  % number of precedence pairs
set of int: PREC = 1..m;
array[PREC] of TOPIC: before;
array[PREC] of TOPIC: after;
set of TOPIC: morning;
int: D;
int: H;
set of int: DAY = 1..D;
set of DAY: HALF;
```

Exam Study Scheduling Data

- Example data

```
n = 10;
hours = [2,5,4,3,6,4,5,4,3,4];
m = 4;
before = [1,1,4,7];
after  = [2,3,5,9];
morning = {4,6,8};
D = 10;
H = 8;
HALF = {3,4,7,9};
```

Exam Study Scheduling: What if

- On half days, topics have to be finished
- But on full days the topic can continue over the mid-day break
- What if you need to finish a topic in a single sitting?
- Two approaches
  - disjunctive_strict and zero length tasks
  - packing problem

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Let's look at Survey 8

In-class Survey

- Does the following diffn constraint have an answer?

```
diffn([0..2,3..5,6,1..5],
[0..1,0..2,0,0..1],[3,1,1,3],[2,2,3,2])
```

  - A: what the hell is diffn?
  - B: definitely has a solution
  - C: probably has a solution
  - D: probably doesn't have a solution
  - E: definitely has no solutions

In-class Survey

- Does the following diffn constraint have an answer?

```
diffn([0..2,3..5,6,1..5],
[0..3,0..2,0,0..1],[3,1,1,3],[2,2,3,2])
```

  - A: what the hell is diffn?
  - B: definitely has a solution
  - C: probably has a solution
  - D: probably doesn't have a solution
  - E: definitely has no solutions

In-class Survey

- Does the following diffn constraint have an answer?

```
diffn([0..2,0..5,6,1..5],
[0..3,0..2,0,0..2],[3,1,1,3],[2,1,3,2])
```

  - A: what the hell is diffn?
  - B: definitely has a solution
  - C: probably has a solution
  - D: probably doesn't have a solution
  - E: definitely has no solutions

In-class Survey

- If a symmetry is a transformation that can produce other solutions, then a dominance is a transformation that can produce
  - A: other symmetries
  - B: better symmetries
  - C: other solutions
  - D: better feasible solutions
  - E: NONE of the above

Exam Study Scheduling

- On half days, topics have to be finished
- But on full days the topic can continue over the mid-day break
- What if you need to finish a topic in a single sitting?
- Two approaches
  - disjunctive_strict and zero length tasks
  - packing problem

Complex Topics

- Some topics need multiple days to study
- For a topic with T hours you need to
  - for k hours on L consecutive days where T = k*L
- The start times on each consecutive day must be the same