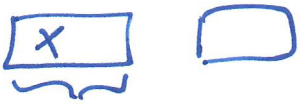
CS5811
September 28, 2020
Monday (1)

Reminder
- Homework 1 due Friday (Oct 2nd)

Previous class
- Interval algebra (IA)

Today
- Point algebra (PA)
- Quantitative Temporal Networks: Temporal CSP (TCSP)
- Simple Temporal Problems (STPs)

Interval Algebra



non-zero duration

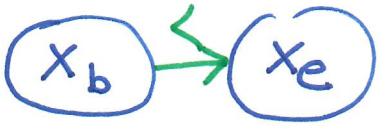
[48, 55] numbers

nodes in the graph

Point Algebra

nodes represent time points in IA

IA

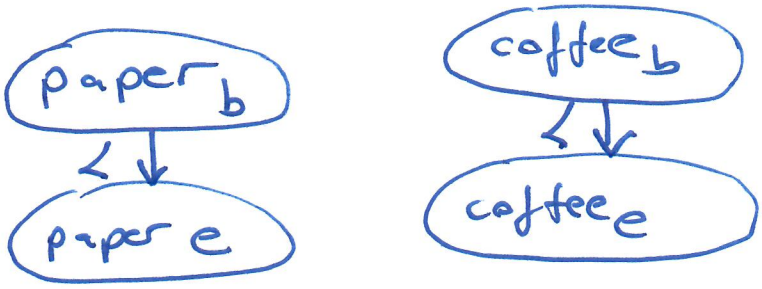


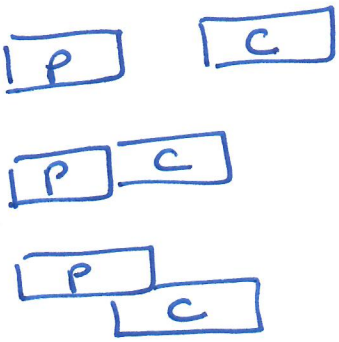
PA

$< = >$

time points that represent event beginning and ending points. (still no numbers)

Fred put down the paper and drank the last of his coffee.



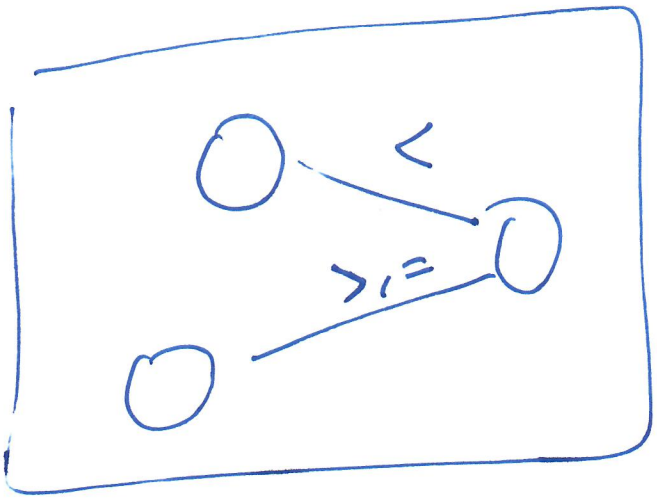


$<, >, =$

$P_b < C_b$

$P_e < C_e$

$C_b < P_e$



entire set of constraints is AND'ed

I before or after J

I b, bi J

Home exercise: Why is this the case?

Why can't we represent

I b, bi J using PA?

I will ask on Wednesday.

IA , PA

common: qualitative (no numbers)

IA: NP-complete

PA: less expressive

Temporal Constraint Satisfaction Problems (TCSPs)

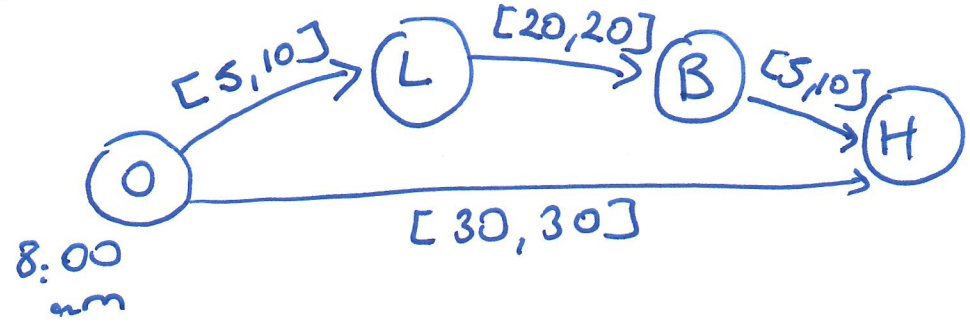
STN: simple temporal networks (special (reduced) case)

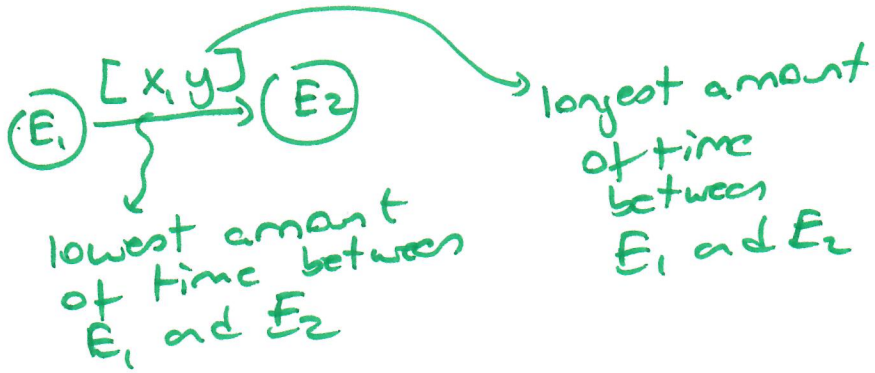
Left home: 8:05 - 8:10 L

Drive to the bridge: 20 minutes (exactly)

I waited 5-10 minutes at the bridge (B)

I was in Houghton (H) at 8:30





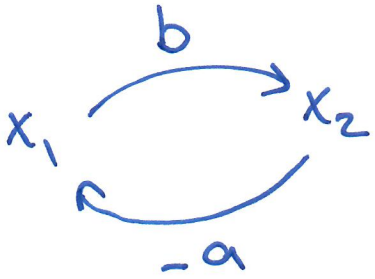
$x_1 \xrightarrow{[a,b]} x_2$ means

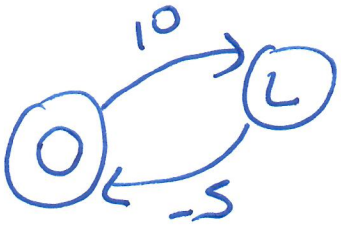
$$a \leq x_2 - x_1 \leq b$$

$$x_2 - x_1 \leq b$$

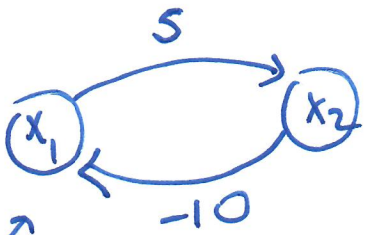
$$a \leq x_2 - x_1$$

$$-a \geq x_1 - x_2$$

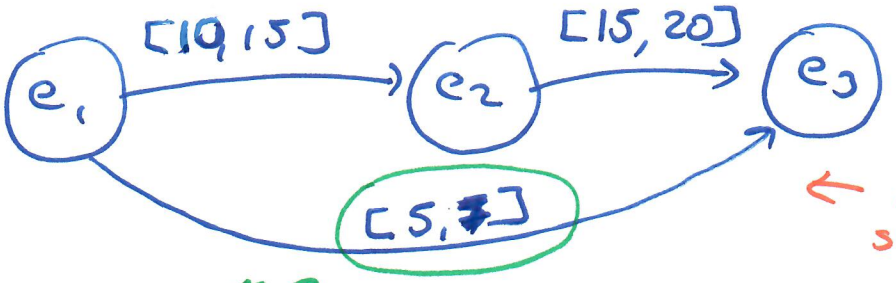




$x_1 \xrightarrow{[10,5]} x_2$

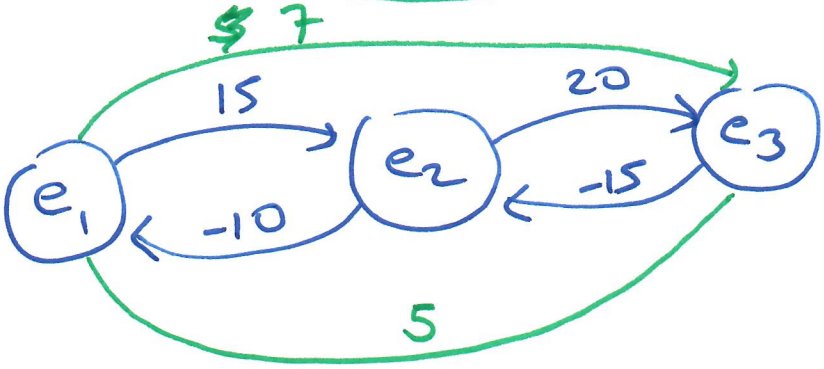


The existence of a negative cycle from x_1 to x_1 shows that this graph is inconsistent



[25, 35]

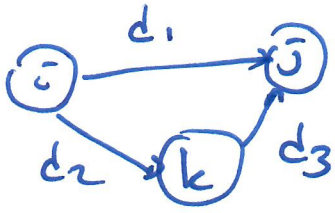
← STN simple temporal network

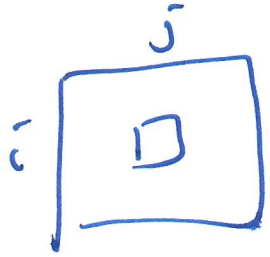


negative cycle

e_1 7 e_3 -15 e_2 -10 e_1

	e_1	e_2	e_3
e_1	0	15	
e_2		0	
e_3			0





d_1

$d_2 + d_3$

n^2

n^3

n^π