Multi Agent Systems - Question 3

3.

a) We used the following query to verify whether free6pm(b) belonged to the grounded set:

grounded((free6pm_b, _)).

The query returned *yes* which confirmed that free6pm(b) belonged to the grounded set.

We also ran the query, *grounded(X)*, where X is bound to the result in the form of (claim, [assumptions]). This returned the complete grounded which is as follows:

X = (free6pm_a,[free6pm_a]) ? ;
X = (free6pm_b,[free6pm_b]) ? ;
X = (free8am_b,[free8am_b]) ? ;
X = (child_a,[child_a]) ? ;
X = (overweight_b,[overweight_b]) ? ;
X = (not_get8am_a,[not_get8am_a]) ? ;
X = (not_free8am_a,[child_a]) ? ;
X = (not_sports_b,[overweight_b]) ? ;

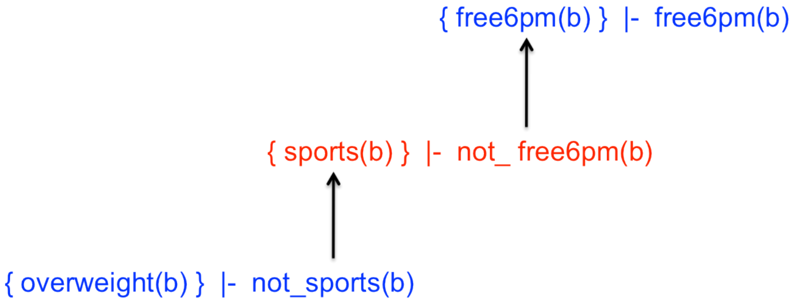
This reassured us that the claim free6pm(b) belonged to the grounded set as the argument *(free6pm_b,[free6pm_b])* is grounded.

To run this query, we had to modify our implementation of grounded to take complex loops into account, as this example dealt with a cycle.

b) SXDD confirms that free6pm(b) belongs to the grounded extension. The table below shows the AB dispute derivation table for free6pm(b).

P: Proponent	O: Opponent	D: Assumptions Supporting Proponent	C: Culprits Chosen in Opponent	Explanation
{free6pm(b)}	{ }	{free6pm(b)}	{ }	Proponent's initial argument which itself is an assumption
{ }	{{not_free6pm(b)}}	{free6pm(b)}	{ }	Claim which is contrary of Proponent's argument
{ }	{{sports(b)}}	{free6pm(b)}	{ }	Derived assumption supporting the Opponent's claim
{not_sports(b)}	{{ }}	{free6pm(b)}	{sports(b)}	Claim which is contrary of Opponent's assumption
{overweight(b)}	{{ }}	{free6pm(b), overweight(b)}	{sports(b)}	Derived assumption supporting the Proponent's claim
{ }	{not_overweight(b)}	{free6pm(b), overweight(b)}	{sports(b)}	Claim which is contrary of Proponent's argument but is not supported by any assumptions, so Opponent cannot validly attack the Proponent with the claim, leaving the Proponent the winner.

This illustrates the dispute derivation.


{ free6pm(b) } |- free6pm(b)
{ sports(b) } |- not_ free6pm(b)
{ overweight(b) } |- not_sports(b)

c) The program can correctly deduce that free8am(b), free6pm(a), free6pm(b) and not_get8am(a) belong to the grounded set. However, it cannot calculate which person gets which appointment in the grounded set because they require mutual exclusion in the availability of Boris and Annie.

If we remove the fact that Boris is overweight, then would correctly assign the two people their desired slots.

With the stable semantics, there could be two possible stable sets.

1. {Grounded} U {get6pm(a), get8am(b), not_get6pm(b)}

We included them into the stable set because:

- get6pm(a) attacks not_get6pm(a) and get6pm(b)
- get8am(b) attacks not_get8am(b), get8am(a) and get6pm(b)
- not_get6pm(b) is attacked by get6pm(b) but if we include get6pm(b) in the stable set it would attack get6pm(a) inside the stable set and thus break the stable semantics. Therefore we simply include not_get6pm(b)

Therefore, in this case, we can say Boris gets the 8am and Anne gets the 6pm.

2. {Grounded} U {get6pm(b), not_get6pm(a), not_get8am(b)}

We included them into the stable set because:

- get6pm(b) attacks not_get6pm(b), get6pm(a), get8am(b)
- not_get6pm(a) is attacked by get6pm(a) but if we include get6pm(a) in the stable set it would attack get6pm(b) inside the stable set and thus break the stable semantics. Therefore we simply include not_get6pm(a)
- not_get8am(b) is attacked by get8am(b) but if we include get8am(b) in the stable set it would attack get6pm(b) inside the stable set and thus break the stable semantics. Therefore we simply include not_get8am(b)

Therefore, in this case, we can say Boris gets the 6pm and Anne doesn’t get an appointment.

We can see that with stable semantics an agent can strongly infer who gets what appointments (in the two different cases). However if we only look at the grounded extension, we can only see what must hold in all cases, which in our case is not_get8am(a), i.e. Anne does not get the 8am appointment. From this we cannot infer who gets what appointment, for example both of them may not get any appointment, which would hold according to our grounded semantics.