Amsterdam University College

Logic, Information flow and Argumentation

Homework exercises, Week 12, part b (due Tuesday 8 May).

1. Translate each one of the following sentences into a formula of epistemic logic, and then provide two *epistemic* models: one in which the formula is true (unless it is a contradiction) and another in which the formula is false (unless it is a tautology).

   (a) If it is raining, Natalia would know it.

   (b) If Natalia does not know that the meeting is today, then she knows that she does not know it.

   (c) Natalia considers possible that Daffy is a bird but also that Daffy is not a bird.

   (d) Natalia knows that Daffy is a bird and also that Daffy is not a bird.

   (e) Natalia knows that if Daffy is a bird, then he flies.

   (f) Natalia knows that dragons fly, but she does not know that she knows it.

   (g) Natalia considers it possible that she considers it possible that her hat is pink, and she does not consider it possible that her hat is pink.

   (h) Natalia knows that if Daffy is a bird, then he flies, and she also knows that Daffy is a bird, but she does not now that Daffy flies.

2. Construct an *epistemic* model in which the following sentences are satisfied at the actual world.

   (a) Hans knows that class has been cancelled.

   (b) Rachel does not know that class has been cancelled.

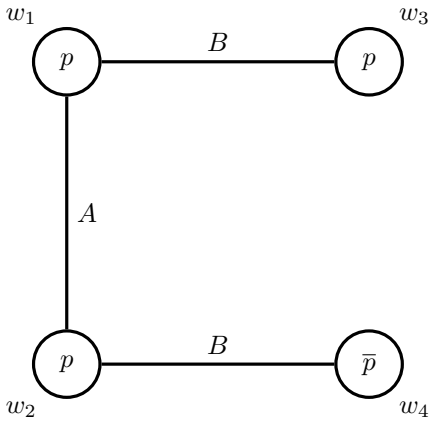
   (c) George considers is possible that Rachel knows that class has been cancelled.

   (d) Hans knows that George does not know whether class has been cancelled.

   (e) Rachel considers it possible that George knows whether class has been cancelled.

(f) George doesn't know that class has been cancelled.

3. Consider the following epistemic model:



For each world in the model, provide a formula that is true only in that world and false in all the others.