

# Dynamic Epistemic Logic

## Phil 143 Worksheet

1. Alice and Bert are told that Cheryl's birthday is among the following list:

- May 15, 16, 19
- June 17, 18
- July 14, 16
- August 14, 15, 17

Cheryl tells Alice the month of her birthday and Bert the day. Then the following announcements are made:

**A:** I don't know her birthday, but I know Bert doesn't know either.

**B:** Now I know her birthday.

**A:** Now I know her birthday.

Draw an epistemic model which represents this situation, and draw the various updated models after each announcement. Use this to determine Cheryl's birthday.

This problem went viral this week: [click here](#) a statement of the problem from the NY Times.

2. For each formula below, determine whether the formula is valid in public announcement logic. If it is, prove it. If not, provide a counterexample.

(a)  $[\!]\alpha [\!]\beta \varphi \leftrightarrow [\!(\alpha \wedge [\!]\beta)] \varphi$

(b)  $[\!]\alpha K_a \varphi \leftrightarrow K_a [\!]\alpha \varphi$

(c)  $\langle [\!]\alpha \rangle \varphi \rightarrow [\!]\alpha \varphi$

3. Which of the standard modal axioms **T**, **D**, **B**, **4**, **5** hold in public announcement logic?