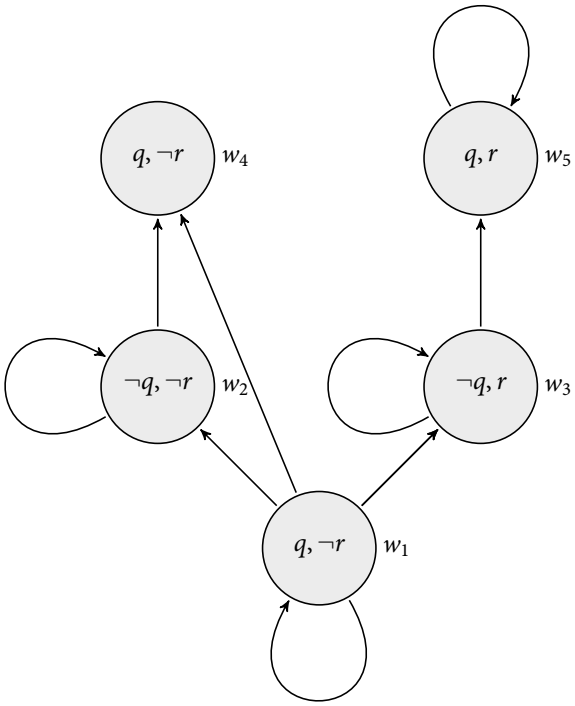
Week Five Assigment

Modal Models and Theorems of K

Due August 7, 5pm



All questions concern the model above. It has five worlds, with accessibility relations show. The truth values for q and r at each world are shown within the within the worlds. (So at w_1, for example, q is true and r false.) Your task is to say which worlds p must be true in order for some things to apply. You should make p true at as few worlds as possible. If the question said "Make $q \to p$ true everywhere in the model, the answer would be w_1, w_4 and w_5. You'll be marked incorrect if you also make p true at w_2, even though that would indeed make $q \to p$ true.

1. Make $\Box p$ true at w_1
2. Make $\Box\Box p$ true at w_1
3. Make $\Diamond q \to p$ true everywhere in the model.
4. Make $\Box p \to p$ true everywhere in the model.
5. Make $\Diamond r \to p$ true everywhere in the model.
6. Make $\Box r \to p$ true everywhere in the model.
7. Make $\Diamond\Box r \to p$ true everywhere in the model.
8. Make $\Box(q \vee p)$ true everywhere in the model.
9. Make $\Box(q \to p)$ true everywhere in the model.
10. Make $\Box(r \vee p)$ true everywhere in the model.

The Logic K

Which of these are theorems of K?

11. $(\Box A \vee \Box B) \to \Box(A \vee B)$
12. $(\Box A \wedge \Diamond B) \to \Diamond(A \wedge B)$
13. $\Box(A \wedge \Diamond B) \to \Diamond(A \wedge B)$
14. $(\Box A \to \Box B) \to (\Diamond A \to \Diamond B)$
15. $\Box(A \to B) \to (\Diamond A \to \Diamond B)$