

## sem.1 Semantic Notions

int:sem:sem:  
sec

**Definition sem.1.** We say  $\varphi$  is *true in the model*  $\mathfrak{M} = \langle W, R, V, w_0 \rangle$ ,  $\mathfrak{M} \Vdash \varphi$ , iff  $\mathfrak{M}, w \Vdash \varphi$  for all  $w \in W$ .  $\varphi$  is *valid*,  $\vDash \varphi$ , iff it is true in all models. We say a set of *formulas*  $\Gamma$  *entails*  $\varphi$ ,  $\Gamma \vDash \varphi$ , iff for every model  $\mathfrak{M}$  and every  $w$  such that  $\mathfrak{M}, w \Vdash \Gamma$ ,  $\mathfrak{M}, w \Vdash \varphi$ .

int:sem:sem:  
prop:sat-entails  
int:sem:sem:  
prop:sat-entails1  
int:sem:sem:  
prop:sat-entails2

**Proposition sem.2.**

1. If  $\mathfrak{M}, w \Vdash \Gamma$  and  $\Gamma \vDash \varphi$ , then  $\mathfrak{M}, w \Vdash \varphi$ .
2. If  $\mathfrak{M} \Vdash \Gamma$  and  $\Gamma \vDash \varphi$ , then  $\mathfrak{M} \Vdash \varphi$ .

*Proof.* 1. Suppose  $\mathfrak{M} \Vdash \Gamma$ . Since  $\Gamma \vDash \varphi$ , we know that if  $\mathfrak{M}, w \Vdash \Gamma$ , then  $\mathfrak{M}, w \Vdash \varphi$ . Since  $\mathfrak{M}, u \Vdash \Gamma$  for all every  $u \in W$ ,  $\mathfrak{M}, w \Vdash \Gamma$ . Hence  $\mathfrak{M}, w \Vdash \varphi$ .

2. Follows immediately from (1).

□

## Photo Credits

## Bibliography