

**HW 9**, due Friday, March 29: problems 1 and 7 on p. 96 of the book (where  $x, y, z$  are distinct variables). For the second part of problem 1 and of problem 7 you can use the following lemma to the effect that we can change bound variables. This lemma is really the correct formulation of 1(iii) on p. 90.

**Lemma 0.1.** *Assume the variable  $v$  does not occur in  $\phi$ . Then*

$$\forall x\phi \vdash \forall v\phi[v/x]$$

*Proof.* From  $\forall x\phi$  as hypothesis we get  $\phi[v/x]$  by  $\forall E$ , and then  $\forall v\phi[v/x]$  by  $\forall I$ . (This last step is allowed since  $v$  does not occur in the hypothesis  $\forall x\phi$  on which  $\phi[v/x]$  depends.)  $\square$