

Some Useful Equivalences

$$\neg \forall x Fx \equiv \exists x \neg Fx$$

$$\neg \exists x Fx \equiv \forall x \neg Fx$$

$$\exists x (Fx \wedge P) \equiv \exists x Fx \wedge P$$

$$\forall x (Fx \vee P) \equiv \forall x Fx \vee P$$

$$\forall x (P \rightarrow Fx) \equiv P \rightarrow \forall x Fx$$

$$\exists x (P \rightarrow Fx) \equiv P \rightarrow \exists x Fx$$

$$\forall x (Fx \rightarrow P) \equiv \exists x Fx \rightarrow P$$

$$\exists x (Fx \rightarrow P) \equiv \forall x Fx \rightarrow P$$

$$\forall x (Fx \wedge Gx) \equiv \forall x Fx \wedge \forall x Gx$$

$$\exists x (Fx \vee Gx) \equiv \exists x Fx \vee \exists x Gx$$

$$\forall x \exists y (Fx \wedge Gy) \equiv \exists y \forall x (Fx \wedge Gy)$$

$$\forall x \exists y (Fx \rightarrow Gy) \equiv \exists y \forall x (Fx \rightarrow Gy)$$

Some Useful Theorems

$$\vdash \forall x Fx \vee \exists x \neg Fx$$