

Tutorial 6

$$\textcircled{1} \quad \text{Ag} \quad \forall x \left(\begin{array}{l} \text{passing}(x, \text{History}) \\ \wedge \\ \text{winning}(x, \text{lottery}) \end{array} \Rightarrow \text{Happy}(x) \right)$$

$$\textcircled{2} \quad \forall x \left(\left(\text{studies}(x) \vee \text{lucky}(x) \right) \Rightarrow \text{passing}(x, \text{Exams}) \right)$$

$$\textcircled{3} \quad \neg \text{studies}(\text{John}) \wedge \text{lucky}(\text{John})$$

$$\textcircled{4} \quad \forall x \left(\text{lucky}(x) \Rightarrow \text{lottery winning}(x, \text{lottery}) \right)$$

$$\textcircled{1} \quad \forall x \neg \left(\begin{array}{l} \text{passing}(x, \text{History}) \\ \wedge \\ \text{winning}(x, \text{lottery}) \\ \vee \\ \text{Happy}(x) \end{array} \right)$$

$$\textcircled{2} \quad \forall x \neg \left(\left(\text{studies}(x) \vee \text{lucky}(x) \right) \vee \text{passing}(x, \text{Exams}) \right)$$

$$\textcircled{3} \quad \neg \text{studies}(\text{John}) \wedge \text{lucky}(\text{John})$$

$$\textcircled{4} \quad \forall x \left(\neg \text{lucky}(x) \vee \text{winning}(x, \text{lottery}) \right)$$

$$① \exists x \left(\neg \text{passing}(x, \text{History}) \vee \neg \text{winning}(x, \text{lottery}) \right) \vee \text{Happy}(x)$$

$$② \forall x \forall y \left(\neg \text{Study}(x) \wedge \neg \text{Lucky}(x) \right) \vee \text{Pass}(x, y)$$

$$③ \neg \text{Study}(x) \vee \text{Lucky}(x)$$

$$④ \text{Study}(x) \wedge \neg \text{Lucky}(x)$$

Distributive \wedge over \vee

$$② \left(\neg \text{Study}(x) \vee \neg \text{Pass}(x, y) \right) \wedge \left(\neg \text{Lucky}(x) \vee \text{Pass}(x, y) \right)$$

$$1. \neg \text{Pass}(x_1, \text{History}) \vee \neg \text{Win}(x_1, \text{Lottery}) \vee \text{Happy}(x_1)$$

$$2. \left(\neg \text{Study}(u) \wedge \neg \text{Lucky}(u) \right) \vee \text{Pass}(u, y)$$

$$3. \text{Study}(u) \vee \text{Lucky}(u)$$

$$4. \text{Study}(u) \wedge \neg \text{Lucky}(u)$$