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3.11) ⑩ 任何喜欢人工智能课并且通过人工智能考试的人都是快乐的

$$\forall x \text{ Person}(x) \wedge \text{Like}(x, \text{AICourse}) \wedge \text{Pass}(x, \text{AIEExam}) \Rightarrow \text{Happy}(x)$$

⑪ 任何上课认真听讲的人都喜欢这门课

$$\forall x, y \text{ Person}(x) \wedge \text{Course}(y) \wedge \text{ListenCarefully}(x, y) \Rightarrow \text{Like}(x, y)$$

⑫ 努力学习的人上课都能认真听讲

$$\forall x, y \text{ Person}(x) \wedge \text{Course}(y) \wedge \text{Hardworking}(x) \Rightarrow \text{ListenCarefully}(x, y)$$

⑬ 聪明或努力学习的人可以通过所有考试

$$\forall x, y \text{ Person}(x) \wedge \text{Exam}(y) \wedge (\text{Smart}(x) \vee \text{Hardworking}(x)) \Rightarrow \text{Pass}(x, y)$$

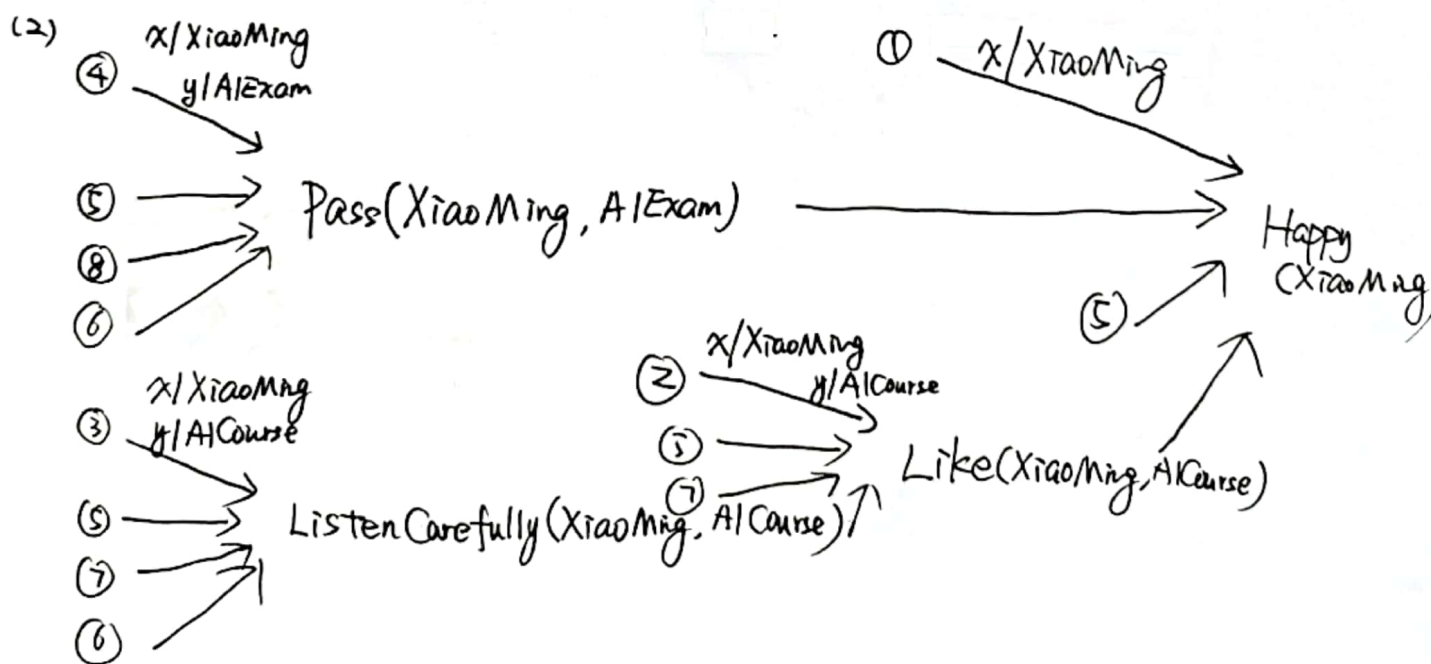
前提: ⑤ 小明是人  $\text{Person}(\text{XiaoMing})$

⑥ 小明努力学习  $\text{Hardworking}(\text{XiaoMing})$

⑦ 人工智能是课  $\text{Course}(\text{AICourse})$

⑧ 人工智能考试是考试  $\text{Exam}(\text{AIEExam})$

目标: ⑨ 小明是快乐的  $\text{Happy}(\text{XiaoMing})$





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$$4. (1) \textcircled{1} \forall x \quad N(x) \Rightarrow GZ(x) \wedge I(x)$$

$$KB: \textcircled{2} \forall x \quad I(x) \Rightarrow E(x) \vee O(x)$$

$$\textcircled{3} \forall x \quad E(x) \Rightarrow I(S(x))$$

$$Q: \text{求证: } \forall x \quad N(x) \Rightarrow O(x) \vee I(S(x))$$

$$(2) KB \wedge \neg Q$$

$$\equiv [\neg N(x) \vee [GZ(x) \wedge I(x)]] \wedge [\neg I(x) \vee E(x) \vee O(x)] \wedge [\neg E(x) \vee I(S(x))] \wedge \neg [\neg N(x) \vee O(x) \vee I(S(x))]$$

$$\equiv [\underbrace{\neg N(x) \vee GZ(x)}] \wedge [\underbrace{\neg N(x) \vee I(x)}] \wedge [\neg I(x) \vee E(x) \vee O(x)] \wedge [\neg E(x) \vee I(S(x))] \wedge \underbrace{N(x) \wedge \neg O(x) \wedge \neg I(S(x))}$$

$$\equiv GZ(x) \wedge \underbrace{I(x)} \wedge [\underbrace{\neg I(x) \vee E(x) \vee O(x)}] \wedge [\neg E(x) \vee I(S(x))] \wedge \neg O(x) \wedge \neg I(S(x))$$

$$\equiv GZ(x) \wedge [\underbrace{E(x) \vee O(x)}] \wedge [\underbrace{\neg E(x) \vee I(S(x))}] \wedge \neg O(x) \wedge \neg I(S(x))$$

$$\equiv GZ(x) \wedge [\underbrace{O(x) \vee I(S(x))}] \wedge \underbrace{\neg O(x)} \wedge \neg I(S(x))$$

$$\equiv GZ(x) \wedge \underbrace{I(S(x))} \wedge \underbrace{\neg I(S(x))}$$

$$\equiv \text{FALSE}$$

$$\text{因此 } KB \neq Q$$

