

First Order Logic

Statement: "If all mammals breathe air, all are mammals, and Max is a dog, then Max breathes air".

(1) FOL Representation

i (P) All mammals breathe air:

$\forall x (\text{mammals}(x) \rightarrow \text{BreatheAir}(x))$

[x is mammal, then x breathes air]

ii All dogs are mammals

$\forall x (\text{Dog}(x) \rightarrow \text{Mammals}(x))$

[x is dog, then x is mammal]

iii Max is a dog

$\text{Dog}(\text{Max})$

(2) Reasoning & Deductions

• Max is Mammal

from (ii) $\forall x (\text{Dog}(x) \rightarrow \text{Mammals}(x))$ & (iii)

$\text{Dog}(\text{Max})$, we get $\text{Mammal}(\text{Max})$
(Max is dog, all dogs are mammals, Max is mammal)

• Max breathes air

from (i) $\forall x (\text{Mammal}(x) \rightarrow \text{BreatheAir}(x))$ &

from $\text{Mammal}(\text{Max})$, we get $\text{BreatheAir}(\text{Max})$

(Max is mammal, all mammals breathe air, Max breathes air)

(3) Conclusion
from the above

- 1 All mammals breathe air
- 2 All dogs are mammals
- 3 Max is a dog.

∴ Breathe Air (Max)

[Max breathes air]

Output :

Max breathes Air.

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