5.12.1 Quantified Predicate Logic:
Truth Tree Problems

A. State which **mistake(s)** are made in each of the following truth trees.

1.

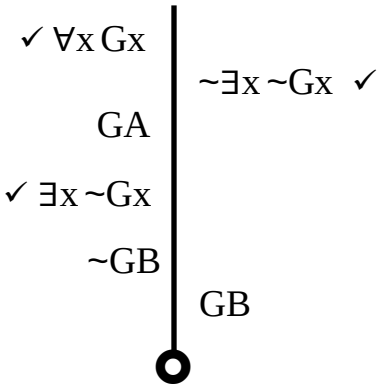
1. Everything is a material object.

∴ Nothing is an immaterial object.

G: ___ is a material object.

1. $\forall x\, Gx$

∴ $\sim\exists x \sim Gx$



Verdict: Invalid

(**A**, Continued)

2.

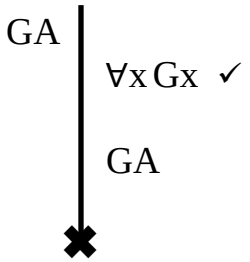
1. The Eiffel Tower is made of metal.

∴ Everything is made of metal.

A: The Eiffel Tower **G**: ___ is made of metal

1. GA

∴ ∀x Gx



Verdict: Valid

(**A**, Continued)

3.

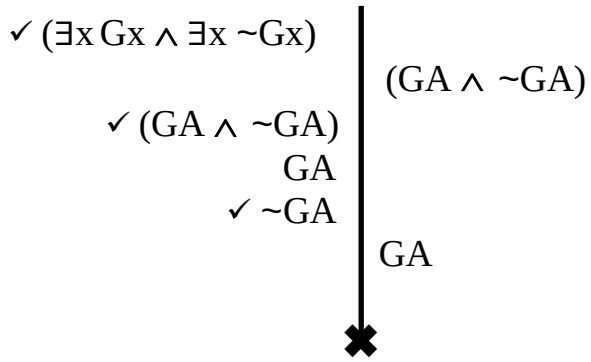
1. Something is made of metal, and something isn't.

∴ The Eiffel Tower is made of metal, but it isn't made of metal.

A: The Eiffel Tower **G**: ___ is made of metal

1. $(\exists x\, Gx \wedge \exists x \sim Gx)$

∴ $(GA \wedge \sim GA)$



Verdict: Valid

B. For each of the following formal arguments, build a **truth tree** to decide if the argument is **valid or invalid**.

1. $(\forall x\, Gx \wedge \forall x\, Hx) \;\therefore\; \forall x\,(Gx \wedge Hx)$

2. $\forall x\,(Gx \wedge Hx) \;\therefore\; (\forall x\, Gx \wedge \forall x\, Hx)$

3. $(\exists x\, Gx \vee \exists x\, Hx) \;\therefore\; \exists x\,(Gx \vee Hx)$

4. $\forall x\, Gx \;.\; \exists x\, Hx \;\therefore\; \exists x\,(Gx \wedge Hx)$

5. $\forall x\,(Gx \vee Hx) \;\therefore\; (\forall x\, Gx \vee \forall x\, Hx)$

6. $(\forall x\, Gx \vee \forall x\, Hx) \;\therefore\; \forall x\,(Gx \vee Hx)$

7. $\sim\forall x\,(Gx \rightarrow Hx) \;\therefore\; \exists x\,(Gx \wedge Hx)$

8. $\exists x\,(Gx \wedge Hx) \;\therefore\; \sim\forall x\,(Gx \rightarrow Hx)$

9. $\forall x\,(Gx \rightarrow Hx) \;.\; \exists x\,(Gx \wedge Hx) \;\therefore\; \forall x\,(Gx \wedge Hx)$

C. **Translate** each of the following arguments into formal language; then build a **truth tree** to decide if the argument is **valid or invalid**.

1. Something is a white tiger. ∴ Something is white, and something is a tiger.

2. Something is round, and something is a square. ∴ Something is a round square.

3. All humans are mammals. All mammals are mortal. ∴ All humans are mortals.

4. Some animals are reptiles. Some animals are dogs. ∴ Some reptiles are dogs.

5. Every number is either even or odd. ∴ Either every number is even, or every number is odd.

6. All penguins are animals. No penguins are mammals. ∴ No mammals are animals.

7. No one gets a medical degree without going to college. Doctor Zhivago is someone who got a medical degree. ∴ Doctor Zhivago is someone who went to college.

8. Only academics are philosophers. Every academic is either contemplative or talkative. Rex is a talkative academic. ∴ Rex is a philosopher.

9. All rational animals are mortal. Some rational beings are not mortal. ∴ Some beings are not animals. (*Note: "being" = "object"*)

10. All philosophers are either wordy or wise. ∴ Either all philosophers are wordy, or all philosophers are wise.

11. All philosophers are either wordy or wise. ∴ Either all philosophers are wordy, or some philosopher is wise.

12. Unexamined lives are not worth living. ∴ If any lives are worth living, examined ones are.

13. Any antique is either attractive or expensive. No tchotchkes are expensive. The Maltese Knick-Knack is an unattractive tchotchke. ∴ The Maltese Knick-Knack is not an antique.