AI ASSIGNMENT – 7

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1. Define Propositional Symbols:
   1. S: Sam plays baseball
   2. P: Paul plays baseball
   3. R: Ryan plays baseball

Express the Knowledge Base (KB):

1. Sam plays baseball or Paul plays baseball: S∨P
2. Sam plays baseball or Ryan doesn’t play baseball: S∨¬R

Thus, the Knowledge Base (KB) is: KB=(S∨P)∧(S∨¬R)

Entailment Check for Given Sentences:

A. Sam and Ryan both play baseball

This statement is: S∧R

Check: We need to see if there is any model (truth assignment) where the KB is true but S∧R is false.

Possible Model: S=true,P=false,R=false

This model satisfies both sentences in the KB:

S∨P → true∨false=true

S∨¬R → true∨true=true

But S∧R is false because R=false.

Thus, KB⊬(S∧R), meaning the KB does not entail "Sam and Ryan both play baseball."

Therefore, No, the KB does not entail "Sam and Ryan both play baseball" (Counterexample: S=true,R=false).

B. At least one among Sam, Paul, or Ryan plays baseball

This statement is: S∨P∨R

Check: We need to see if there is a model where the KB is true but S∨P∨R is false.

For S∨P∨R to be false, all of S, P, and R must be false.

However, if S=false and P=false, the first sentence of the KB S∨P would be false, violating the KB.

Thus, there is no model where the KB is true and S∨P∨R is false.

Therefore, KB⊨(S∨P∨R)

Yes, the KB entails "At least one among Sam, Paul, or Ryan plays baseball."