Example of FOL Theorem Proving

Axioms:

F_1 = x = x

F_2 = x = y --> y = x

F_3 = x = y ^ y = z --> x = z

F_4 = (x + y) = (y + x)

F_5 = (x + (y + z)) = ((x + y) + z)

F_6 = (x + 1) = y ^ (y + 1) = z --> z = (x + (1 + 1))

F_7 = x + 0 = x

F_8 = x + 1 = (x + 1) + 0

Number n = (1 + (1 + ... 0) ;number n is represented as n successive ;additions of 1 to 0

Prove G = 2+2=4 is a logical consequence of the axioms!

Clauses:

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 (1): ( =(x,x) )
 (2): ( ~=(x,y)  =(y,x) )
 (3): ( ~=(x,y) ~=(y,z) =(x,z) )
 (4): ( =( +(x,y), +(y,x)) )
 (5): ( =( +(x, +(y,z)), +(+(x,y),z)) )
 (6): ( ~=(+(x,1), y) ~=(+(y,1),z)   =(z, +(x, +(1,1))) )
 (7): ( =( +(x,0), x) )
 (8): ( =( +(x, 1) , +( +(x, 1) ,0)) )

~G(9): (  ~=( +( +(1,+(1,0)), +(1,+(1,0))),  +(1,+(1,+(1,+(1,0)))) ) )
 ;                |<--2-->|    |<--2-->|      |<----4---->|
```

Ok, now run your theorem prover.