Math Methods, Assign 3, Problem 3

Prove that

(a) 

\[ [A, [B, C]] = [B, [A, C]] - [C, [A, B]] \]

(b) 


Solution:

These simple identities can be shown just by expanding both sides of equations:

(a) 

\[ [A, [B, C]] = ABC - ACB - BCA + CAB \]

\[ [B, [A, C]] - [C, [A, B]] = BAC - BCA - ACB + CAB - CAB + CBA + ABC - BAC \]

where the wave-underlined expressions cancel.

(b) 

\[ [A, BC] = ABC - BCA \]