1.) Suppose we have two operators $A$ and $B$ that may not commute. Show that

$$e^A B e^{-A} = B + [A, B] + \frac{1}{2!} [A, [A, B]] + \frac{1}{3!} [A, [A, [A, B]]] + \cdots = \sum_{n=0}^{\infty} \frac{1}{n!} A^n \{ B \}$$

where

$$A^0 \{ B \} = B, \quad A^1 \{ B \} = [A, B], \quad A^2 \{ B \} = [A, [A, B]], \quad \text{etc.}$$

2.) Sakurai, problem 1.27

3.) Sakurai, problem 1.28

4.) Sakurai, problem 1.29