

1. Let $G \subset Gl(n, \mathbb{R})$ be a matrix Lie group. Let $M(u) = e^{Au}$ and $N(v) = e^{Bv}$ be 1-parameter subgroups of G . Let P be the (group) commutator of M and N , that is, let

$$P(s) := M(s)N(s)(M(s))^{-1}(N(s))^{-1}$$

- (a) Determine a (nonzero) tangent vector to the curve $P(s)$ in G at $P(0) = I$.
- (b) **True or False:** $[A, B]$ is the generator of the curve $P(s)$. *Justify your answer.*