

HINT 2 for (11-5.b): Use the product rule for differentiable matrix-valued functions $t \mapsto \mathbf{A}(t), \mathbf{B}(t)$

$$\frac{d}{dt}(\mathbf{A}(t)\mathbf{B}(t)) = \dot{\mathbf{A}}(t)\mathbf{B}(t) + \mathbf{A}(t)\dot{\mathbf{B}}(t), \quad (11.5.3)$$

which is a special version of the general product rule [Lecture $\rightarrow$ Eq. (8.5.1.17)].