

1. Starting from the formula $e^{z_1} e^{z_2} = e^{z_1+z_2}$ for all complex numbers z_1 and z_2 , and using the fact that $e^{i\theta} = \cos \theta + i \sin \theta$ for all $\theta \in \mathbb{R}$, show

$$\begin{aligned}\sin(\theta + \phi) &= \sin(\theta) \cos(\phi) + \cos(\theta) \sin(\phi) \\ \cos(\theta + \phi) &= \cos(\theta) \cos(\phi) - \sin(\theta) \sin(\phi).\end{aligned}$$

2. Use the results of problem 1) to show that $SO(2)$ is a matrix group.
3. Text: 1.1.2
4. Text: 1.1.3
5. Derive the formulas $R_{\theta_1} R_{\theta_2} = R_{\theta_1+\theta_2}$ and $z_{\theta_1} z_{\theta_2} = z_{\theta_1+\theta_2}$.
6. Text: 1.2.3 (You'll want to read page 6 first)
7. Text: 1.2.4
8. Text: 1.2.5