

55. Verify  $(\sin x + \cos x)^2 = 1 + \sin(2x)$

$$\begin{aligned} \text{LHS} &= (\sin x + \cos x)^2 \\ &= \sin^2 x + 2 \sin x \cos x + \cos^2 x \\ &= \sin^2 x + \cos^2 x + 2 \sin x \cos x \\ &= 1 + 2 \sin x \cos x \\ &= 1 + \sin(2x) = \text{RHS} \end{aligned}$$

Notice that I used the identity  $\sin(2x) = 2 \sin x \cos x$  to go from the second-to-last step to the last step.