(a) 2D rotation

S^1: $\cos^2\varphi + \sin^2\varphi = 1$

$(\cos\varphi, \sin\varphi)$

(b) Surface normal vector

$[N_x, N_y, N_z]$

S^2: $N_x^2 + N_y^2 + N_z^2 = 1$

(c) 3D rotation

$q = a + b\mathbf{i} + c\mathbf{j} + d\mathbf{k}$

S^3: $a^2 + b^2 + c^2 + d^2 = 1$