1.1 **Show that a closed 1-form θ on $S^1 \times (-1, 1)$ is dF for some function $F :$ $S^1 \times (-1, 1) \to \mathbb{R}$ if and only if $\int_{S^1} i^*\theta = 0$ where $i : S^1 \to S^1 \times (-1, 1)$ is defined by $i(p) = (p, 0)$ for $p \in S^1$.**

1.2 **Show that a 2-form ω on S^2 is $d\theta$ for some 1-form θ on S^1 if and only if $\int_{S^2} \omega = 0$.**