1. (a) If \( \{e_1, \ldots, e_n\} \) is an orthonormal basis of \( \mathbb{R}^n \), then \( \text{Ric}_G(x) = \sum_i |x_i|^2 \) for any \( x \in \mathbb{R}^n \). Since \( \mathbb{R}^n \) has trivial center, \( \text{Ric}_G(x) > 0 \) for all \( x \neq 0 \).

Since the sphere \( S^{n-1} \) is compact, there exists \( c > 0 \) such that \( \text{Ric}_G(x) \geq c \) for all \( x \) with \( |x| = 1 \). Thus we can apply Myers to conclude that \( G \) and its universal cover are compact.

(b) \( \text{SL}(n, \mathbb{R}) \) has trivial center and \( \text{SL}(n, \mathbb{R}) \) is not compact.

(c) Follows directly from (a).

2. Let \( M \) be the orientable double cover of \( \mathbb{RP}^2 \times \mathbb{RP}^2 \). Since \( \pi_1(\mathbb{RP}^2 \times \mathbb{RP}^2) = \mathbb{Z}/2\mathbb{Z} \), \( M \) is not simply connected (otherwise \( \pi_1 \) would have at most 2 elements). Now apply Synge.