1) **Let $S^2 = \{x \epsilon R^3 : ||x|| = 1\}$ and obtain RP^n by identification of antipodal points of S^2. Define $f: R^3 \to R^4$ by $f(x_1, x_2, x_3) = (x_1^2 - x_2^2, x_1 x_2, x_1 x_3, x_2 x_3)$. Since $f(-x) = f(x)$, $F|_{S^2}$ defines a mapping $\breve{f}: RP^2 \to R^4$. Show that $\breve{f}$ is a C^∞ imbedding.**

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2. Show that $SO(n) := \{A \in O(n) :\ \det A = 1\}$ is a manifold.

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3) **Let A be a submanifold of M and B be a submanifold of N. Show that $A \times B$ is (by inclusion)a submanifold of $M \times N$.**

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4) let $f: N \to M$ *be a one to one immersion* which is proper, i.e. the inverse image of any compact set is compact. Show that f is an imedding and that its image is a closed regular submanifold of M.(A regular submanifold is a subspace with inclusion as an imbedding map)