Quiz 6 Name:

Winter 2011 Math 765

Consider a smooth 2-manifold M; we denote the vector space of 1-forms on M by $\Omega^1(M)$. Let $\mathrm{Emb}(S^1, M)$ denote the set of embedded circles in M (i.e., injective immersions from S^1 to M), and $\mathbb{R}[\mathrm{Emb}(S^1, M)]$ the real vector space with basis $\mathrm{Emb}(S^1, M)$. Its dual is $\mathbb{R}[\mathrm{Emb}(S^1, M)]^\star$.

The *period map* $p : \Omega^1(M) \to \mathbb{R}[\mathrm{Emb}(S^1, M)]^\star$ sends a 1-form ω to the functional $f_\omega : \mathbb{R}[\mathrm{Emb}(S^1, M)] \to \mathbb{R}$ given by $f_\omega(i) = \int_{S^1} i^\star(\omega)$ for an embedding $i : S^1 \to M$.

Is p a surjective function? If not, why not?

Solution