Midterm 1 / 2013.3.8 / MAT 5263.001 / Algebraic topology

Name: _____

Please show all work and justify your answers.

1. Show that the exponential map $t \mapsto \exp(it)$ from $\mathbf{R}$ to S^1 gives a universal cover of S^1.
2. Show that if two pointed topological spaces are homotopically equivalent, then their fundamental groups are isomorphic.
3. Verify directly that the 1-form $\omega = y^2z^4\,dx + 2xyz^4\,dy + 4xy^2z^3\,dz$ is closed. Then show that it is exact by finding a function whose differential is ω.
4. Suppose U is a non-empty open subset of $\mathbf{C}$. Show that $f\colon U \to \mathbf{C}$ is holomorphic if and only if $f(z)\,dz$ is a closed 1-form.
5. Represent the sphere as a simplicial complex and compute its homology groups.

1	2	3	4	5	total (50)	%

Prelim. course grade: %