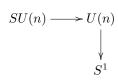
## MAT7064, Topics in Geometry and Topology

## Assignment 7

Due in-class on Friday, November 22

1. The special unitary group SU(n) is the subgroup of U(n) consisting of matrices of determinant 1, and there are fibration sequences



where the last map is the determinant. Using this, the Serre spectral sequence, and the Hurewicz theorem, compute  $\pi_k(U(n))$  for  $k \leq 3$ .

- 2. Knowing  $SO(3) \cong \mathbb{RP}^3$ , compute  $H^*((SO(4))$  together with its cup product.
- 3. Using the Serre spectral sequence and the path-loop fibrations

$$\begin{array}{c} K(A,n) \xrightarrow{\phantom{aaaa}} * \\ & \downarrow \\ K(A,n+1) \end{array}$$

show that the rational cohomology groups  $H^*(K(\mathbb{Z}/m, n); \mathbb{Q})$  are trivial for all m, n > 0.

4. Compute the rational cohomology groups  $H^*(K(\mathbb{Z}, n); \mathbb{Q})$  for all n.