1. Let $X$ be obtained from $S^2$ by identifying two points (for example, the north and south poles). Find $H_\ast(X)$.

2. If $k < n$, compute $H_\ast(\mathbb{RP}^n/\mathbb{RP}^k)$. (Start with some examples, like $\mathbb{RP}^5/\mathbb{RP}^2$ and $\mathbb{RP}^5/\mathbb{RP}^3$.)

3. Let $X$ be obtained from $S^1$ by attaching two 2-cells via maps of degree 2 and 3, respectively. Compute $H_\ast(X)$.

4. Find $H_\ast(S^1 \times (S^1 \vee S^1))$. 