1) Let $T = S^1 \times S^1$ the torus. What is $H_n(T) \forall n \geq 0$? Calculate this.

2) What is $H_n(S^1 \vee S^1 \vee S^2) \forall n \geq 0$? Is $S^1 \vee S^1 \vee S^2$ homeomorphic to $T$? Are they homotopy equivalent?

3) Suppose $f:[0,1] \rightarrow [3,5]$ is a homeomorphism. What can you say about $f(0)$? Prove it.

4) Suppose $(E,p)$ is a covering space of $S^3$. What can you say about $E$?

5) Suppose $X$ is a space with $\pi_1(X,x_0) = \mathbb{Z}_6$. What can you say about the covering spaces of $X$? What “nice” properties of $X$ do you need for this?

6) Let $X$ be a compact Hausdorff space. What properties does $X$ have? Prove $X$ is regular.

7) Consider $\mathbb{R}^\omega$. Let $\mathbb{R}^\omega = \{\{x_n\} \in \mathbb{R}^\omega : x_n = 0$ for all but finitely many $n\} \subseteq \mathbb{R}^\omega$. What is the closure of $\mathbb{R}^\omega$ in (a) the product topology? (b) the box topology?

8) Calculate $H_n(X,A)$

![Diagram of a torus with a subset A labeled as equivalent to S']