Throughout, $S^n := \{x \in \mathbb{R}^{n+1} : ||x|| = 1\}$.

**Exercise 1.1.** Prove that there are no embeddings of $S^1$ into $\mathbb{R}^1$.

**Exercise 1.2.** Show that $S^3$ is homeomorphic to $\mathbb{R}^3 \cup \{\infty\}$, the one-point compactification of $\mathbb{R}^3$. This allows us to interchange between studying knots in $\mathbb{R}^3$ and $S^3$ for example.

**Exercise 1.3.** Up to ambient isotopy, how many different embeddings are there of $S^1$ into $S^1, S^2, \mathbb{R}^2, \mathbb{R}^2 - \{(0,0)\}$ and $T^2$ (the 2-torus).

**Exercise 1.4.** Show that an injective, continuous map from a compact space to a Hausdorff space is an embedding.

**Exercise 1.5.** Give an example of an injective, continuous map between two spaces which is not an embedding.

**Exercise 1.6.** Show that if $f_0, f_1 : X \to Y$ are two embeddings which are ambient isotopic then they are isotopic.

**Exercise 1.7 (Medium).** Prove that a tame knot in $\mathbb{R}^2$ bounds a disk.

**Exercise 1.8 (Hard).** Prove that a knot in $\mathbb{R}^3$ is tame if and only if it is smooth, that is ambient isotopic to a smooth knot. Hint: To show the reverse direction first show that if $K$ is a smooth knot then there exists $r > 0$ such that the $r$-neighbourhood of $K$ is a solid torus.