Please, also have a look at Homework Set 5, since we have not discussed it.

**Problem 1**
(a) Show that $S^\infty$ is contractible. Why was that not true for $S^n$?
(b) Why are the Hawaiian earrings not a CW-complex?

**Problem 2**
Last week we studied the homology of $T^2$ and considered its representation as a square with opposite sides identified in the correct way. Then we cut out a smaller square $D$ and chose a 1-cycle $a$ on the boundary of $D$ which represents a homology class which generates $H_1(\partial D)$.

(a) Complete the construction of a 2-chain $b$ in $T^2 \setminus D$ such that

\[ \partial b = a. \]

(b) Provide a similar argument for the Klein bottle