In addition to problems 1, 2, 9, 17 and 18 on pages 18–19 of Hatcher, please do the following.

Real and complex projective spaces are defined (as Examples 0.4 and 0.6) on pages 6–7 of Hatcher. A point in $\mathbb{R}P^n$ [$\mathbb{C}P^n$] can be defined by $n + 1$ real [complex] coordinates, not all zero, denoted by $[x_0, x_1, \ldots x_n]$, meaning the real [complex] line that goes through the origin and the point $(x_0, x_1, \ldots x_n)$. Hence for any nonzero scalar $\lambda$, this is the same as $[\lambda x_0, \lambda x_1, \ldots \lambda x_n]$.

Show that the map $f : \mathbb{C}P^n \to \mathbb{R}P^n$ given by

$$f([x_0, x_1, \ldots x_n]) = [|x_0|, |x_1|, \ldots |x_n|]$$

is well defined and null homotopic.