(1) Munkres 52.1
(2) Munkres 55.2
(3) Munkres 55.4 parts (a)–(d)
(4) Does every continuous map $S^2 \to S^2$ have a fixed point? If so, prove it. If not, give a counterexample, and see if you can find a more restrictive statement which you think is true.
(5) The fundamental group of products...
   (a) Let $X$ and $Y$ be path-connected spaces. Prove that $\pi_1(X \times Y) = \pi_1(X) \times \pi_1(Y)$.
   (b) Conclude that $T^2$ is not homeomorphic to $S^2$.
   (c) What is $\pi_1(\mathbb{R}^2 \setminus 0)$?
   (d) Show that $T^3$, $S^1 \times S^2$ and $S^3$ are all distinct (i.e., no pair of them is homeomorphic). (Recall that $T^3 = S^1 \times S^1 \times S^1$.)
(6) (From Hatcher): Show that composition of paths has the following cancellation property:
   Let $\gamma_0, \gamma_1$ be paths from $p$ to $q$ and $\eta_0, \eta_1$ paths from $q$ to $r$. Suppose that $\gamma_0 * \eta_0 \sim \gamma_1 * \eta_1$ (rel endpoints) and $\eta_0 \sim \eta_1$ (rel endpoints). Then $\gamma_0 \sim \gamma_1$ (rel endpoints).

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