TOPOLOGY - III, SOLUTION SHEET 7

Exercise 1. This is Corollary 2.25 in Hatcher's book, on page 126 .

Exercise 2. By sheet 5, exercise 3, part (5) we know that $H_1(\mathbb{R}, \mathbb{Q}) = \mathbb{Z}^{\mathbb{Q}}$. Now using the definition of quotient topology, note that $\mathbb{R}/\mathbb{Q}$ has the trivial topology. Hence $H_1(\mathbb{R}/\mathbb{Q}) = 0$.

Exercise 3. Please refer to the proof of Theorem 1.9 in Hatcher's book on page 31 and note that the same proof goes through by replacing π_1 by H_1.

Exercise 4. This is Theorem 2.26 in Hatcher's book, on page 126.