Name:

1. For each of the following sets, determine if the set is open, closed or neither. Give an explanation/proof of why your answer is correct.

(a) \( S_1 = \{0\} \subset \mathbb{R}^n \)

(b) \( S_2 = \{(x, y)|x = y\} \subset \mathbb{R}^2 \)

(c) \( S_3 = \{(x, y)|x \neq y\} \subset \mathbb{R}^2 \)

2. Find the limit and prove that the limit you found is correct.

\[
\lim_{k \to \infty} \frac{1}{2k}
\]