

Please note there are two pages. Complete all parts. Quizzes will count towards your homework grade.

Problem 1.

(a) Let E be a set in a metric space X . Prove that if E is open, then its complement is closed.

(b) Let $\{E_k\}_{k \in \mathbb{N}}$ be a collection of sets. Prove that

$$\left(\bigcap_k E_k \right)^c = \bigcup_k E_k^c.$$

Problem 2. Circle True or False. If the answer is False, give a counter example of your choice.

(a) The intersection of closed non-empty intervals is non-empty.

(circle one): True False

(b) The intersection of closed non-empty intervals is closed.

(circle one): True False

(b) The intersection of closed non-empty intervals nested intervals is non-empty.

(circle one): True False