

Practice Midterm

Problem 1 Let A_α be the set of points lying on the curve

$$y = \frac{1}{x^\alpha} \quad (0 < x < \infty).$$

What is $\bigcap_{\alpha \geq 1} A_\alpha$?

Problem 2 Let M be any infinite set and A any countable set. Show that $|M| = |M \cup A|$.

Problem 3 List all the elements of $A = \bigcap \{6, 7, \{4, 8\}\}$.

Problem 4 Let X be a group for which $x^2 * y^2 = (x * y)^2$ for all $x, y \in X$. Prove that X is abelian.

Problem 5 Listed below are all the elements g of the group $G = \mathbb{Z}/3 \times \mathbb{Z}/4$. Circle each g such that $\langle g \rangle = G$ (i.e. generators of G):

(0, 0)	(0, 1)	(0, 2)	(0, 3)
(1, 0)	(1, 1)	(1, 2)	(1, 3)
(2, 0)	(2, 1)	(2, 2)	(2, 3)