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 $\cap_{\alpha \geq 1} A_\alpha$?
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 $A = \cap\{6, 7, \{4, 8\}\}$.
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 thge group $G = \mathbb{Z}/3 \times \mathbb{Z}/4$. Circle each g such that $< g >= G$ (i.e. generators of G):

$$\begin{array}{cccc} (0,0) & (0,1) & (0,2) & (0,3) \\ (1,0) & (1,1) & (1,2) & (1,3) \\ (2,0) & (2,1) & (2,2) & (2,3) \end{array}$$