Math 215 - Introduction to Advanced Mathematics

Problem Set 12

Spring 2018
Due in class on Friday, May 4

For each of the following questions give your answer and then explain the reasons why your answer is correct using full sentences.

1. Let X be a set with n elements. How many relations can we define on X? How many of these are reflexive? How many are symmetric? How many are antisymmetric?

2. Define a binary relation $\sim$ on $\mathbb{R}^2$ by $(x_1, y_1) \sim (x_2, y_2)$ if and only if $x_1^2 + y_1^2 = x_2^2 + y_2^2$. Prove that $\sim$ is an equivalence relation. Describe its equivalence classes.

3. Let X be a set and let $R_1, R_2 \subseteq X \times X$ be two partial orders of X. Prove that $R_1 \cap R_2$ is also a partial order of X.

4. Let S be a set and let $f : S \to S$ be some function. Is f a relation on S?