1. [**8 points**] Define the relation R on $\mathbb{Z}$ to be

   $R = \{(a, b) \in \mathbb{Z} \times \mathbb{Z} \mid a + b \text{ is odd.}\}$

   Which of the three properties (reflexivity, symmetry, transitivity) does this relation satisfy? Explain.

2. [**12 points**] Define the relation R on $\mathbb{Z}$ to be

   $R = \{(a, b) \in \mathbb{Z} \times \mathbb{Z} \mid a + b \text{ is even.}\}$

   (a) Show that R is an equivalence relation.

   (b) How many distinct equivalence classes are there under R? What are they?