Due on November 1, 2021   Name_____

1. Let us say that two integers are **near** one another provided the absolute value of their difference is 3 or smaller (i.e. the numbers are at most 3 apart). For example, 3 is near to 6, 10 is near 9, but 8 is not near 4. Let R stand for this is-near-to relation. Please do the following:

    a. Write down R as a set of ordered pairs. Your answers should look like this:
    $$R = \{(x, y): \cdots\}$$

    b. Prove or disprove: R is reflexive.

    c. Prove or disprove: R is irreflexive.

    d. Prove or disprove: R is symmetric.

    e. Prove or disprove: R is antisymmetric.

    f. Prove or disprove: R is transitive.

2. For each equivalence relation below, find the requested equivalence class.

    a. $R = \{(1, 1), (1, 3), (3, 1), (2, 2), (3, 3), (4, 4)\}$ on $\{1, 2, 3, 4\}$. Find $[1]$.

    b. $R = \{(1, 1), (1, 3), (3, 1), (2, 2), (3, 3), (4, 4)\}$ on $\{1, 2, 3, 4\}$. Find $[4]$.

    c. R is has-the-same-tens-digit-as on the set $\{x \epsilon \mathbb{Z} : 100 < x < 200\}$. Find $[132]$.

    d. R is has-the-same-parents-as on the set of all human beings. Find $[you]$.