

QUIZ 2
MATH2301, 2025

Name: _____

UID: U_____

Justifications are not required in any of the questions.

(1) (4 points) Select either true or false in each case.

(a) For an equivalence relation \sim , if $a \sim b$ then the equivalence class of a is equal to the equivalence class of b .

True

False

(b) If $a \equiv b \pmod{60}$, then $a \equiv b \pmod{30}$.

True

False

(c) There is no $x \in \mathbb{Z}/8\mathbb{Z}$ such that $[2]x + [4] = [0]$.

True

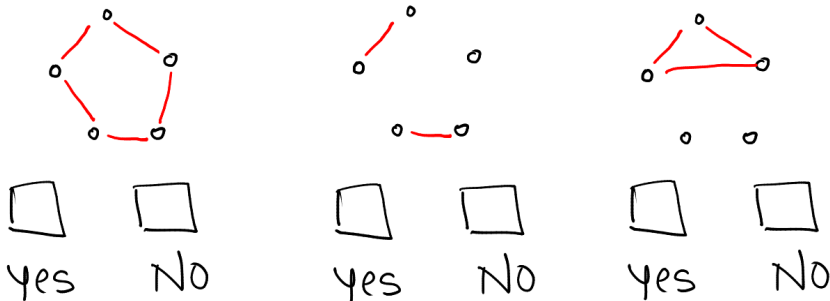
False

(d) On \mathbb{Z} , say $a \sim b$ if 3 divides $a + b$. Then \sim is an equivalence relation.

True

False

(2) (3 points) Which of the following graphs represent equivalence relations? The relation is assumed to be reflexive and symmetric, so self-loops and arrows are omitted.



(1) (3 points) Define \sim on \mathbb{R}^2 by $(a, b) \sim (c, d)$ if $a^2 + b^2 = c^2 + d^2$. Plot the equivalence class of $(1, 0)$.

SOLUTIONS

- (1)
 - (a) True
 - (b) True
 - (c) False
 - (d) False
- (2) Only the second and the third.
- (3) The equivalence class of $(1, 0)$ is the set of all (x, y) such that $x^2 + y^2 = 1^2 + 0^2 = 1$. That is the unit circle.