Exercise 1
For points \((x_1, y_1)\) and \((x_2, y_2)\) in the plane \(\mathbb{R}^2\), determine which are equivalence relations:

(i) \((x_1, y_1) \sim (x_2, y_2)\) if \(y_1 = y_2\);
(ii) \((x_1, y_1) \sim (x_2, y_2)\) if \(x_1 = x_2\) or \(y_1 = y_2\);
(iii) \((x_1, y_1) \sim (x_2, y_2)\) if \(x_1 - x_2\) is integer.

For the equivalence relations, determine equivalence classes.

Exercise 2
(i) Prove that if \(a|b\) (\(a\) divides \(b\)) and \(b|c\), then \(a|c\).
(ii) Prove that if \(a|b\) and \(b|a\), then \(a = \pm b\).

Exercise 3
(i) For each pair \(a, b\), perform the division of \(a\) by \(b\) with remainder:

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a = 19, \quad b = 5, \quad a = -7, \quad b = 5;
\]

(ii) Prove that if \(m|n\) and \(a \equiv b \mod n\), then \(a \equiv b \mod m\);
(iii) For which \(n\) is \(25 \equiv 4 \mod n\)?