

Math 270 - Basic Discrete Mathematics  
Practice Quiz on Section 8.3

Solutions

Directions: Answer the problem given below.

1. Define the relation  $R$  on the set  $A = \{-4, -3, -2, -1, 0, 1, 2, 3, 4\}$  as follows:

$$\text{For all } x, y \in A, xRy \Leftrightarrow 3|(x^2 - y^2).$$

This relation  $R$  is an equivalence relation: find its distinct equivalence classes.

To simplify calculations:

$x$	-4	-3	-2	-1	0	1	2	3	4
$x^2$	16	9	4	1	0	1	4	9	16

First,  $[-4]$ : easy to see that

$$(-4)R(-4), (-4)R(-2), (-4)R(-1), (-4)R1, (-4)R2, (-4)R4,$$

$$\text{so } [-4] = \{-4, -2, -1, 1, 2, 4\}.$$

$$([2] = [-1] = [1] = [2] = [4])$$

Next,  $[-3]$ :

$$(-3)R(-3), (-3)R0, (-3)R3, \text{ so}$$

$$[-3] = \{-3, 0, 3\}. ([0] = [3])$$

Since  $\{-4, -2, -1, 1, 2, 4\} \cup \{-3, 0, 3\} = A$ ,

these are the distinct equivalence classes of  $R$ .