Assignment 7 Part 2

David Yan

Thursday, February 18, 2016 11:55 PM

9.4-6 a Given a set of 7 integers, must there be two that have the same remainder when divided by 6? Why?

Yes! The modulus of 6 (%6) has 6 possible outcomes (0-5)

By the pigeon hole principle. Two numbers will share a remainder

b Given any set of 7 integers, must there be two that have the same remainder when divided by 8? Why?

No! The modulus of 8 (%8) has 8 possible outcomes (0-7)

This means that not every container is filled. Could there be two? Yes. Must there? No.

9.4-7 Let $S = \{3,4,5,6,7,8,9,10,11,12\}$ Suppose six integers are chosen from S. Suppose 6 integers are chosen from S. Must there be two integers whose sum is 15?

There are 5 sub sets that fulfill this criteria

$\{3,12\}, \{4,11\}, \{5,10\}, \{6,9\}, \{7,8\}$

since 6 will be chosen, the pigeon holes can be filled

9.4-16 How many integers from 1-100 must you pick in order to be sure of getting at least one that is divisible by 5.

The probability of getting a number divisible by 5 is $1 \cdot 10 \cdot 2 = 20/100$

This means that you can pick up to 80 integers without getting a number divisible by 5

the 81st number must be divisible.

9.4-27 In a group of 2000 people, must at least 5 have the same birthday? Why?

Given a 365 day year, 2000 people fit 5.479... people. The ceiling is 6. Therefore the pigeonhole principle is fulfilled.