Math 2300: Discrete Mathematics
Counting 2 - Pigeonhole Principle Textbook Section

Terms, Concepts, and Examples

- **The Pigeonhole Principle** - If k is a positive integer and $k+1$ or more objects are placed into k boxes, then there is at least one box containing two or more of the objects.

  Example: In a group of 367 people at least two will have the same birthday because there are only 366 possible birthdays (counting February 29).

  Video Example of Pigeonhole Principle - Picking Socks

  Video Example of Pigeonhole Principle - Subsets

  Another Video Example of Pigeonhole Principle

Practice Problems

1. How many students must be in a class to guarantee that at least two students receive the same score on the final exam, if the exam is graded on a scale from 0 to 100 points?

2. How many students must be in a class to guarantee that at least FIVE students receive the same score on the final exam, if the exam is graded on a scale from 0 to 100 points?

3. A drawer contains a dozen brown socks and a dozen black socks, all unmatched. A man takes socks out at random in the dark.

   (a) How many socks must he take out to be sure that he has at least two socks of the same color?

   (b) How many socks must he take out to be sure the he has at least two black socks?