

Discrete Mathematics

Counting and Probability

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The Pigeonhole Principle

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The (Original) Pigeonhole Principle

If there are more pigeons than holes, at least one of the holes has at least 2 pigeon.

Example. If there are more than 366 people, then at least two people will share a birthday.

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The General Pigeonhole Principle

If there are n pigeons in k holes, then at least one of the holes has at least $\lceil n/k \rceil$ pigeons.

Example. Among a group of 50 people, there are at least five whose birthday falls in the same month.