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example of pigeonhole principle

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A example.

**Theorem.** *For any set of 8 integers, there exist at least two of them whose difference is divisible by 7.*

*Proof.* The residue classes modulo 7 are 0, 1, 2, 3, 4, 5, 6. We have seven and eight integers. So it must be the case that 2 integers fall on the same residue class, and therefore their difference will be divisible by 7.  $\square$