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Chapter 3

4.

Show that if $n+1$ integers are chosen from the set $\{1, 2, \ldots, 2n\}$, then there are always two which differ by 1.

5.

Show that if $n+1$ distinct integers are chosen from the set $\{1, 2, \ldots, 3n\}$, then there are always two which differ by at most 2.

6.

Generalize Exercises 4 and 5.

8.

Use the pigeonhole principle to prove that the decimal expansion of a rational number m/n eventually is repeating. For example,

$$\frac{34,478}{99,900} = 0.345125125125\cdots .$$

12.

Show by example that the conclusion of the Chinese rmainder theorem (Application 6) need not hold when m and n are not relatively prime.