

MTHSC 3190 SECTION 5.24

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PROPOSITION

Let $n \in \mathbb{N}$. Then there exists integers $a \neq b$ such that $10|(n^a - n^b)$.

PROOF.



PROPOSITION

Given 5 distinct integer lattice points in \mathbb{R}^2 , at least one of the line segments determined by these points has an integral midpoint.

PROOF.



PROPOSITION (CANTOR)

Let A be a set. If $f : A \rightarrow 2^A$, then f is **NOT** onto.

NOTE

If A is finite then $|A| < |2^A| = 2^{|A|}$ and the result follows trivially from the pigeon hole principle.

PROOF.

Let A be a set. We will find $B \in 2^A$ (-i.e. $B \subseteq A$) such that $B \notin \text{im}(f)$.

Take $B = \{x \in A : x \notin f(x)\}$.

Claim: $B \notin \text{im}(f)$.

Proof:

