

Weekly Homework 4

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Introduction to Abstract Math

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Theorem 3.28. Assume $n \in \mathbb{Z}$. If n^2 is even, then n is even. Prove by proving the contrapositive.

Proof. We will prove by using the contrapositive. The contrapositive of the statement is “If n is odd, then n^2 is odd.” In Problem 2.9, we proved that the product of an odd integer and an odd integer is odd. We know by this proof that n^2 is an odd integer, therefore we know that our contrapositive statement is true. By Theorem 3.25, we know that our original statement is true. \square

Theorem 3.32. Suppose $n \in \mathbb{Z}$. If n^2 is even then n is even. Prove by contradiction.

Proof. To prove by contradiction, we will assume the following statement: “In n^2 is even, then n is odd.” In Problem 2.9, we proved that the product of an odd integer and an odd integer is odd. By this proof, if n is odd then n^2 must also be odd. However, this contradicts our assumption that n^2 is even. Therefore, our original statement must be true. \square