Recall the below *Previous Shown Results*, which are on the Ch. 1 Handout.

Previously Shown Results

Lemma SEE. The sum of two even integers is an even integer.
Lemma SEO. The sum of an even integer and an odd integer is an odd integer.
Lemma SOO. The sum of two odd integers is an even integer.
Lemma PEA. The product of an even integer and any integer is an even integer.
Lemma POO. The product of two odd integers is an odd integer.

▷. **Theorem 5**. If x is an even integer, then

$$3x^2 + 2x + 3$$

is an odd integer.

Note symbolically: $(\forall x \in \mathbb{Z})\,[\ x \text{ is even} \implies 3x^2 + 2x + 3 \text{ is odd}\ ]$

►. Prove Theorem 5 by using *Previous Shown Results* (which are in the above box).

▷. You should use a subset of: Lemma SEE, Lemma SEO, Lemma SOO, Lemma PEA, Lemma POO.

A proof that uses the definition of even/odd for any reason other than to argue the parity (even/odd-ness) of the number 3 and 2 will receive no credit.

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