Test Flight Question 2

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Theorem. *The sum of any five consecutive integers is divisible by 5.*

Proof. Concretely, we are trying to prove the following:

$$(\forall z \in \mathcal{Z})(5 \mid z + (z+1) + (z+2) + (z+3) + (z+4))$$

Simplifying this, we get this expression:

$$5 \mid 5z + 10.$$

This statement is true for $z = 0$ because 10 is divisible by 5. If z increases by 1, RHS increases by 5 and divisibility by 5 is conserved. Likewise, if z decreases by 1, RHS decreases by 5 and divisibility by 5 is still conserved. Thus the statement is true for all integers and the statement is proved. $\square$