Proof 2

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Say whether the following is true or false and support your answer by a proof: The sum of any five consecutive integers is divisible by 5 (without remainder).

Proof

We want to prove:

$$n + (n+1) + (n+2) + (n+3) + (n+4) = 5k + 0$$
(by the definition of divisibility)

where $n, k \in \mathbb{Z}$.

Now,

$$\begin{aligned} n + (n+1) + (n+2) + (n+3) + (n+4) &= 5n + 10 \\ &= 5(n+2) + 0 \end{aligned}$$

where $k = n + 2$.

Which proves that the sum of any five consecutive integers is divisible by 5. We did it!