

C241 HW10 Mini

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1 Problem 1

Claim: The sum of three odd numbers is always odd.

Proof. Choose odd integers n_1, n_2, n_3 .

Since n_1 is odd, there exists an integer k_1 such that $n_1 = 2k_1 + 1$.

Similarly, there exists integers k_2 and k_3 with $n_2 = 2k_2 + 1$ and $n_3 = 2k_3 + 1$.

$$\begin{aligned}n_1 + n_2 + n_3 &= 2k_1 + 1 + 2k_2 + 1 + 2k_3 + 1 \\&= 2k_1 + 2k_2 + 2k_3 + 2 + 1 \\&= 2(k_1 + k_2 + k_3 + 1) + 1\end{aligned}$$

Since $k_1, k_2, k_3, 1 \in \mathbb{Z}$, $k_1 + k_2 + k_3 + 1 \in \mathbb{Z}$.

Since $n_1 + n_2 + n_3 = 2(k_1 + k_2 + k_3 + 1) + 1$ and $k_1 + k_2 + k_3 + 1 \in \mathbb{Z}$, $n_1 + n_2 + n_3$ is odd.

□