Single Number

Key observations:

- For any integer X: $X \hat{} X = 0$ and $X \hat{} 0 = X$.
- XOR is commutative and associative: order doesn't matter.

Strategy:

Scan the array once and XOR all elements into a running variable.

- Every number that appears twice cancels out ($a \hat{} a = 0$).
- Only the number that appears once remains in the end.

Why it meets the requirements:

- Linear time: one pass over nums.
- Constant space: only one accumulator variable.
- Works with negative: XOR operates on bit patterns; sign doesn't matter.