Homework 3

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Proposition 1. If A is even and B is odd, then 3A+2B is even.

Proof. There exists a K and J that are integers such that $A = 2K$ and $B = 2J + 1$. Now, by plugging in our new A and B, we have $3A + 2B = 3(2K) + 2(2J + 1)$. When multiplied out, we have $3A + 2B = 6K + 4J + 2 = 2(3K + 2J + 1)$. If we let $3K + 2J + 1 = K_1$ where K_1 is an integer, $3A + 2B = 2(K_1)$. So by definition, $2K_1$ is even, so $3A + 2B$ is even. □

Proposition 2. If $6 \mid A$, then $36 \mid A^2$.

Proof. Suppose $6 \mid A$, so there exists an integer K such that $6K = A$. By squaring both sides, $A^2 = (6K)^2 = 36K^2$. Because K^2 is an integer, by definition $36 \mid A^2$. □