n \neq m \\
\text{\textit{Hence by definition of congruence,}} \\
\text{\textit{we have}} \\
\text{\textit{since}} \\
\text{\textit{if}} \\
\text{\textit{and}} \\
\text{\textit{where}} \\
\text{\textit{in \mathbb{Z}}} \\
\text{\textit{and}}
(c) Show that \((3n+2)^2 \text{ even} \Rightarrow \text{ even}\) \(\forall \) \(n \in \mathbb{Z}\).
Note: On base2.

\[ (\text{even}) (3^n+2) \equiv n \pmod{4} \]

\[ \text{Let } (n \in \mathbb{Z}) \text{ odd} \]

\[ 3n+2 = 2(3k+2) + 1 \]
\[ 2n+2 = 6k+2+2 = 6k+4 + 1 \]
\[ 3n+2 = 3(2k+1) + 2 \]
\[ n = 2k+1 \quad (k \in \mathbb{Z}) \]

To prove Counterposition.
This is what we did...

Proof by contradiction.

Assume \((n+2)\) is even, \(n\) is even.

\((2n+2)\) is even, \(n\) is odd.

Contradiction!

\((2n+2) = 2\) \((n+1)\) is odd.

\((n+2)\) is even, \(n\) is even.

Since \(3\) is odd.
Try: \( a = 0 + 2 + 0 \) (no)

For the smallest such number (case)

Is one such number. So we look we have to show that there

\[
\begin{align*}
\exists n \in \mathbb{Z} : 3n + 2 = 3n + p \quad \text{and} \quad 2n + 2^p \\
\end{align*}
\]

We proved
\[ 6 = 1^2 + 1^2 + 1^2 \quad \text{(m)} \]

\[ 5 = 1^2 + 2^2 + 0^2 \quad \text{(m)} \]

\[ 4 = 2^2 + 0^2 + 0^2 \quad \text{(m)} \]

\[ 3 = 1^2 + 1^2 + 1^2 \quad \text{(m)} \]

\[ 2 = 1^2 + 1^2 + 0^2 \quad \text{(m)} \]

\[ 1 = 1^2 + 0^2 + 0^2 \quad \text{(m)} \]
Three squares have 9 cannot be written as sum of

\[ 1^2 + 2^2 + 2^2 = 9 \]

The next possible number is 15