3) In order to prove the sets A_n and B_n are disjoint, I will prove that:

$A_n \not\subseteq B_n$ and $B_n \not\subseteq A_n$

Case [1] Case [2]

Case [1]: Assume $\forall x \in \mathbb{Z}, (x \in A_n) \Rightarrow (x \in B_n)$, let n be an arbitrary integer ≥ 3,

∴ Let a be a integer such that an

∴ Assume $an+1$ is an integer and sub it into [A] for the b value.

[A] $n \mid (b+1)$

$\Rightarrow n \mid ((an+1)+1)$

$\Rightarrow n \mid (an+2)$

$\Rightarrow nK = an+2$ (for some integer K)

$\Rightarrow K = a + \frac{2}{n}$ ← Contradiction

- This is a contradiction as in order for K to be an integer then $\frac{2}{n}$ needs to be an integer which is impossible as $n \geq 3$.