**MATH 450 Seminar in Proof**

Prove that the set of odd negative integers is countable.

We actually don't technically usually write it this way. We don't have a concise way to write it:(. So probably best to just use "X, where X is the set of…."

*Proof.* We know that a set $X$ is countable if there exists a bijection in $f : \mathbb{N} \to X$. Let $f : \mathbb{N} \to -2\mathbb{Z} - 1$ such that $f(n) = 1 - 2n$ period
We first show that the function has a valid co-domain. For some $n \in \mathbb{N}$ just some? we have $f(n) = 1 - 2n$. We know that $n > 0$ then $-2n < 0$ and is even. Thus, $1 - 2n$ is a negative odd integer. Now we will prove that
to what does this refer? it is bijective.

**One-to-One:**

Let $f(a) = f(b)$ where $a, b \in \mathbb{N}$. Then since, $f(a) = f(b)$ we know that $1 - 2a = 1 - 2b$. Thus $a = b$. Therefore $f$ is one-to-one.

**Onto:**

Let $y \in -2\mathbb{Z} - 1$ then $y < 0$. Observe that $f\left(\frac{1-y}{2}\right) = 1 - 2\left(\frac{1-y}{2}\right) = y$. Since $y \leq -1$ then $\frac{1-y}{2} \geq 1$ show this a little more explicitly. Thus $\frac{1-y}{2} \in \mathbb{N}$. why is it an integer?
Hence, the function is onto.
Thus $f : \mathbb{N} \to 2\mathbb{Z} - 1$ with $f(n) = 1 - 2n$ is bijective. Thus the set of odd negative integers are countable. $\square$