Math 113 Theorems.

1. **Prop.** The relation $\equiv \pmod{n}$ is an equivalence relation.
2. **Prop.** $\mathbb{Z}/n\mathbb{Z}$ has exactly $n$ elements.
   (a) **Prop 0.** If $i \in [j]$, then $j \in [i]$ (in $\mathbb{Z}/n\mathbb{Z}$).
   (b) **Prop 1.** If $[i] \cap [j] \neq \emptyset$, then $[i] = [j]$.
   (c) **Prop 2.** If $i \neq j$ and $0 \leq i, j \leq n-1$, then $[i] \cup [j] = \emptyset$.
   (d) **Prop 3.** Every $x \in \mathbb{Z}$ belongs to one of $[0], \ldots, [n-1]$.
3. **Prop.** Addition is correctly (well-defined) defined on $\mathbb{Z}/n\mathbb{Z}$ by $[a] + [b] = [a+b]$.
4. **Prop 3.17.** The identity element in any group is unique.
5. **Prop 3.18.** The inverse is unique for any element $g$ in a group $G$.
6. **Prop 3.19.** For any $a, b \in G$, where $G$ is a group, $(a \star b)^{-1} = b^{-1}a^{-1}$.
7. **Prop 3.20.** For any $g \in G$, where $G$ is a group, then $(g^{-1})^{-1} = g$.