Exercise 1. The language contains only a symbol for a binary relation e. The theory T says that e is an equivalence relation and that there are (exactly) 2 classes containing n elements for each $n \in \omega \smallsetminus \{0\}$.

Most of the following questions have a short answer.

1. Show that every saturated model of T contains a class with infinitely many elements.
2. Show that every model countable model containing n classs with n elements for each $n \in \omega \smallsetminus \{0\}$ and infinitely many infinite classes is saturated.
3. Is the previous claim true for uncountable models?
4. Prove that the theory T has quantifier elimination.
5. Is T countably categorical?
6. Is T is complete?
7. Is T categorical is some uncountable cardinal?
8. What is $\mathrm{acl}(\varnothing)$?
9. Let $\mathcal{U} \models T$ be saturated. If $e(a, \mathcal{U})$ contains 2 elements, what is $\mathrm{dcl}\{a\}$?
10. Let $e(b, \mathcal{U})$ be infinite. What is $\mathrm{acl}\{b\}$?
11. If b is like above. What is the orbit of b under $\mathrm{Aut}(\mathcal{U})$?
12. Is T strongly minimal?