The following theorem is true:

For all $k$, there exists a number $n = \text{CLR}_1(k)$ such that for all colorings (any number of colors) of $\{k, k+1, k+2, \ldots, n\}$, one of the following holds:

- there exists a large homogeneous set
- there exists a large rainbow set

And now for the project:

1. Prove the above theorem using the Large Ramsey Theorem. Specifically, show that $\text{CLR}_1(k) \leq \text{LR}_2(k)$.

2. Give an exact formula for $\text{CLR}_1(k)$. Realize this entails finding both colorings for lower bounds and a proof for upper bounds. (You should not need to use the Large Ramsey Theorem at all)