6) Suppose we start with n sets, each containing a distinct element.

a) Show that if u unions are performed, then no set contains more than u + 1 elements.

b) Show that at most $n - 1$ unions can be performed before the number of sets becomes 1.

If a set has n elements, then it needs n-1 times of union perform. Another set has u-n element, then it need u-n-1 times of union perform. Thus to perform it until the number of set becomes 1 needs u-1 times of perform. So there is not a set with more than u element in this case.