Solution

The Algorithm: The intuition of this algorithm is compare every interval with every other interval, and return the largest set of intervals that do not overlap.

```
While there is an interval r that has not been visited,
       Select an interval r at random
       Check to see how many intervals r is compatible with
       Set a variable max to be number of intervals that r is compatible with,
                         and store the values of those other intervals
                         mark those other intervals as visited
       Continue to do this until every interval r has been selected
       If there is an interval r with a higher max than the set max value, update max and u
```

Time and Space:

This algorithm compares each interval in the set R with every other interval, and as such it runs with $O(n^2)$ time. It stores all the values in a data structure, taking up n space.

Proof:

Assume that this algorithm does not return the optimal solution. Therefore that means that there is some other optimal solution that returns a set M of size larger than max. But our algorithm checks every possible set of compatible intervals. Therefore if such a larger set existed, our algorithm would have found it.