2) (5 pts) ANL (Algorithm Analysis)

An algorithm to process input data about n cities takes O(n!) time. For n = 10, the algorithm runs in 10 milliseconds. How many ***seconds*** should the algorithm take to run for an input size of n = 12?

Let the algorithm with input array size n have runtime $(n) = cn!$, where c is some constant.

Using the given information, we have:

$$T(10) = c(10!) = 10ms$$

$$c = \frac{10ms}{10!}$$

Now, solve for the desired information:

$$T(12) = c(12!)$$

$$= \frac{10ms}{10!} \times 12! = \frac{10ms}{10!} \times 10! \times 11 \times 12 = 10ms \times (132) = 1320ms = 1.32sec$$

Grading: 2 pts solving for c, 2 pts for plugging 12 and canceling to get to 1320 ms, 1 pt to answer in seconds.