2) (10 pts) ANL (Algorithm Analysis)

A backtracking solution took $O(n(k^n))$ time where n is the number of decisions, and k was the number of options for each decision. With n of 20 and k of 1 the time it took was approximately 10 seconds. What is the expected time required for an input of 10 decisions (n=10) where each decision has 2 options (k=2) in **seconds**?

The runtime is in seconds can be expressed as $cn(k^n)$ where c is some constant. We can find the c by plugging in n=20 and k=1 and setting the results to 10. We find that

$$10s = c20(1^{20})$$
$$\frac{10s}{20(1)} = c$$
$$c = .5s$$

To solve for the question we plug in n=10 and k=2.

$$Answer = (.5s)10(2^{10})$$
$$= 5s(1024)$$
$$= 5120s$$

Grading:
Find c, 4 pts.
Plugging in 10 and 2, 4 pts.
Correct answer, 2 pts.