Discrete Structures (CSCI 246)
in-class activity

Recall the steps for proving a statement "$\forall n \geq 0$: something" using induction:

(1) Clearly state the property $P(n)$, that you are using mathematical induction, and what variable you are doing induction over.

(2) Prove the base case: $P(0)$.

(3) Prove the inductive case: $P(n-1) \Rightarrow P(n)$.

Suppose that we have two different candidate algorithms to solve a problem related to a set S, one that tries all 2^n possible subsets of S, and one that computes the solution by looking at just n^2 subsets. We can prove that the second algorithm is faster (with a caveat for small n) than the first using mathematical induction.

First, notice that the claim does not hold for small n by filling in the following table:

n	2^n	n^2
0		
1		
2		
3		

So you will need to adjust the above steps slightly to prove this claim.

Claim: For all integers $n \geq 4$, we have $2^n \geq n^2$.

Proof.

(1)

(2)

(3)

$\square$