Some comments on your text on Yoneda Lemma

1. The result that you obtain is not the "Yoneda Lemma" as such, but the explicit construction of the *Yoneda embedding Y* of a category *C* to the category of natural transformations between contravariant functors from *C* to *Set* defined as follows:

- For an object *A* of *C,* then *Y(A)* is the contravatiant functor *C(-, A); C → Set* (this functor has for codomain Set and not C as you write).
- *Y* associates to a morphism *m: A → B* the natural transformation

Y(m): C(-, A) → C(-, B) such that *Y(m)(x) = mx* for each *x: X → A.*

2. The *Yoneda Lemma* as such is a (not evident) consequence of this embedding. ,

Yoneda Lemma: *Given a contravariant functor F from C to Set; for each object A of C the set F(A) is in bijection with the set of natural transformations from C(-, A) to F.*