

## Math 614 Quiz 2

Let  $X$  be a completely arbitrary set, and let  $A$  be an arbitrary commutative ring with unity.

Let  $\mathcal{S}$  be the set of *all functions* from  $X$  to  $A$ . That is,  $\mathcal{S} = \text{Mor}_{\text{Set}}(X, A)$ .

Observe that point-wise addition and multiplication endows  $\mathcal{S}$  with a natural ring structure.

TRUE OR FALSE. IF FALSE, GIVE A COUNTEREXAMPLE.

- (1) The ring  $\mathcal{S}$  is commutative and has a multiplicative identity  $1_{\mathcal{S}}$ .
- (2) The ring  $\mathcal{S}$  is reduced.
- (3) For any  $x \in X$ , the “evaluation map”  $\mathcal{S} \rightarrow A$  sending  $f \mapsto f(x)$  is a ring homomorphism.
- (4) For any  $x \in X$ , the kernel of the “evaluation map”  $\mathcal{S} \rightarrow A$  sending  $f \mapsto f(x)$  is a maximal ideal.