3.1 Let A, B, C be objects in C and hence objects in C^{op}. Let $f \in \mathsf{Hom}_{\mathsf{C}^{op}}(A, B)$ and $g \in \mathsf{Hom}_{\mathsf{C}^{op}}(B, C)$. Thus $f \in \mathsf{Hom}_{\mathsf{C}}(B, A)$ and $g \in \mathsf{Hom}_{\mathsf{C}}(C, B)$. Since C is a category, the morphism $f \circ_{\mathsf{C}} g$ exists in C. Define $\circ_{\mathsf{C}^{op}}$ as $g \circ_{\mathsf{C}^{op}} f := f \circ_{\mathsf{C}} g$. We are guaranteed that the composition of morphisms exists since C is a category. We gain associativity for the same reason. The composition of identity in C^{op} becomes composition of identity on the other side in C, which is still an identity.

3.2 $\mathsf{End}_{\mathsf{Set}}(A)$ is defined as $\mathsf{Hom}_{\mathsf{Set}}(A, A)$. This is the set of all set-functions $A \to A$; in other words, the set A^A. Thus $|\mathsf{End}_{\mathsf{Set}}(A)| = |A^A| = |A|^{|A|}$ (the last equality from a previous exercise.)

3.3