Functor

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Let C and D be categories. A **functor** F from C to D is a mapping that - associates each object X in ob(C) to an object $F(X)$ in ob(D). - associates each morphism $f : X \to Y$ in C to a morphism $F(f) : F(X) \to F(Y)$ in D such that the following two conditions hold: - $F(\mathrm{id}_X) = \mathrm{id}_{F(X)}$ for every object X in C, - $F(g \circ f) = F(g) \circ F(f)$ for all morphisms $f : X \to Y$ and $g : Y \to Z$ in C.

That is, functors must preserve identity morphisms and composition of morphisms.