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## The general power rule

If we combine the rule  $\frac{d}{dx}[x^n] = nx^{n-1}$  with the chain rule, we find a time-saving rule which codifies how we have been taking derivatives of functions of the form  $[h(x)]^n$ .

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By definition  $e^{\ln x} = x$ , so differentiating both sides we get  $e^{\ln x} \times \frac{d(\ln(x))}{dx} = 1$  or  $x \frac{d(\ln(x))}{dx} = 1$ , which establishes the following.

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**Example 8.** *Find the derivative of the function  $f(x) = x \ln(x)$ .*