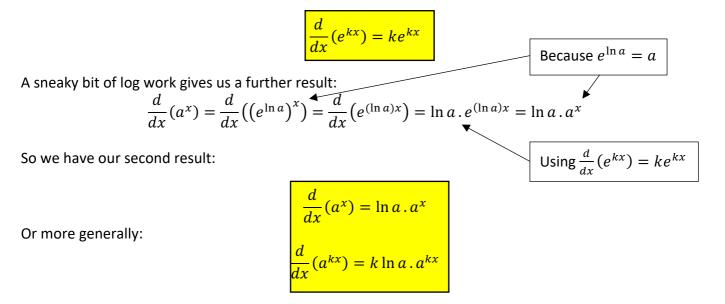
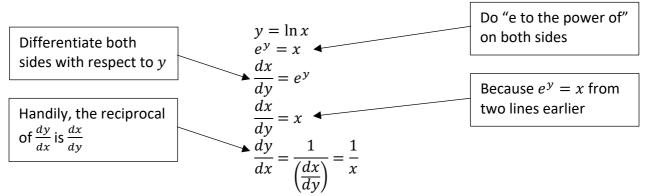
Differentiating Exponentials and Logs

We met the constant e earlier in the course. It should not be a surprise that $\frac{d}{dx}(e^x) = e^x$. More generally:



Another sneaky bit of rearrangement gives us a further result:



Hence the third result:

$$\frac{d}{dx}(\ln x) = \frac{1}{x}$$

e.g. Find the gradient of $y = e^{6x} + 2^x + \ln x$ when x = 2

$$\frac{dy}{dx} = 6e^{6x} + \ln 2 \cdot 2^x + \frac{1}{x}$$

$$@x = 2, \qquad \frac{dy}{dx} = 6e^{12} + 4\ln 2 + \frac{1}{2}$$

e.g. Find the equation of the tangent to $y = 3^{2x} - \ln x$ at x = 1 in the form y = mx + c