

1. Show that:

$$(a) \exp(a - b) = \frac{\exp(a)}{\exp(b)}$$

$$(b) (\exp(a))^q = \exp(qa) \text{ where } q \in \mathbb{Q}.$$

2. Define $a^b = \exp(b \ln(a))$. Prove the following (notice we have already shown all of these when the exponent is rational):

$$(a) a^{b+c} = a^b a^c$$

$$(b) a^{b-c} = \frac{a^b}{a^c}$$

$$(c) (\exp(a))^b = \exp(ba)$$

$$(d) (a^b)^c = a^{bc}$$

$$(e) D_x(x^a) = ax^{a-1}$$

$$(f) D_x(a^x) = \ln(a)a^x.$$