

Math 16B
Kouba
Differentiating Exponentials

$$\text{Let } y = a^x \quad \longrightarrow$$

$$\ln y = \ln a^x \quad \longrightarrow$$

$$\ln y = x \cdot \ln a \quad \longrightarrow \quad (\text{Differentiate implicitly.})$$

$$\frac{1}{y} \cdot y' = \ln a \quad \longrightarrow$$

$$y' = y \cdot \ln a \quad \longrightarrow$$

$$y' = a^x \cdot \ln a .$$

$$\underline{\text{RULE}} : \quad D\{a^x\} = a^x \cdot \ln a$$

$$\underline{\text{RULE}} : \quad D\{e^x\} = e^x$$

$$\underline{\text{CHAIN RULE}} : \quad D\{a^{f(x)}\} = a^{f(x)} \cdot f'(x) \cdot \ln a$$

$$\underline{\text{CHAIN RULE}} : \quad D\{e^{f(x)}\} = e^{f(x)} \cdot f'(x)$$