

MATH 2501 Quiz 5 Fall 2018

Compute

$$\frac{d}{dx} (\sqrt{2})^x$$

Solution: Rewrite

$$(*) \quad (\sqrt{2})^x = e^{\ln(\sqrt{2})^x} = e^{x \ln(\sqrt{2})}$$

Therefore,

$$\frac{d}{dx} (\sqrt{2})^x = \frac{d}{dx} e^{x \ln(\sqrt{2})}$$

$$\begin{aligned} u &= x \ln(\sqrt{2}) \\ \frac{du}{dx} &= \ln(\sqrt{2}) \end{aligned}$$

$$= \frac{du}{dx} \frac{d}{du} e^u$$

$$= \ln(\sqrt{2}) e^u$$

$$= \ln(\sqrt{2}) e^{x \ln(\sqrt{2})}$$

$$(*) \quad = \ln(\sqrt{2}) (\sqrt{2})^x$$