Calculus I

Derivatives involving trigonometry and exponents

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Example (Using the Product Rule twice)

Differentiate:

$$y = \theta e^{\theta} (\tan \theta + \sec \theta).$$

Product Rule:

$$y' = rac{\mathsf{d}}{\mathsf{d} heta} \left(heta \mathbf{e}^{ heta}
ight) \left(an heta + \sec heta
ight) + heta \mathbf{e}^{ heta} rac{\mathsf{d}}{\mathsf{d} heta} (an heta + \sec heta)$$

Product Rule:

$$= \left(\theta \frac{d}{d\theta} \left(e^{\theta}\right) + \frac{d}{d\theta} (\theta) e^{\theta}\right) (\tan \theta + \sec \theta) + \theta e^{\theta} \left(\sec^2 \theta + \tan \theta \sec \theta\right)$$

$$= \left(\theta (e^{\theta}) + (1) e^{\theta}\right) (\tan \theta + \sec \theta) + \theta e^{\theta} (\sec^2 \theta + \tan \theta \sec \theta)$$

$$= \theta e^{\theta} \sec \theta (\sec \theta + \tan \theta) + e^{\theta} (\theta + 1) (\tan \theta + \sec \theta)$$

$$= (\theta \sec \theta + \theta + 1) e^{\theta} (\tan \theta + \sec \theta).$$