

MATH-101 Exam2

THE QUOTIENT RULE If f and g are differentiable, then

$$\frac{d}{dx} \left[\frac{f(x)}{g(x)} \right] = \frac{g(x) \frac{d}{dx} [f(x)] - f(x) \frac{d}{dx} [g(x)]}{[g(x)]^2}$$

$$\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$$

$$\lim_{\theta \rightarrow 0} \frac{\cos \theta - 1}{\theta} = 0$$

DERIVATIVES OF TRIGONOMETRIC FUNCTIONS

$$\frac{d}{dx} (\sin x) = \cos x$$

$$\frac{d}{dx} (\csc x) = -\csc x \cot x$$

$$\frac{d}{dx} (\cos x) = -\sin x$$

$$\frac{d}{dx} (\sec x) = \sec x \tan x$$

$$\frac{d}{dx} (\tan x) = \sec^2 x$$

$$\frac{d}{dx} (\cot x) = -\csc^2 x$$

THE CHAIN RULE

$$F(x) = f(g(x))$$

$$F'(x) = f'(g(x)) \cdot g'(x)$$

THE CHAIN RULE

if $y = f(u)$ and $u = g(x)$

$$\frac{dy}{dx} = \frac{dy}{du} \frac{du}{dx}$$

THE POWER RULE COMBINED WITH THE CHAIN RULE

$$\frac{d}{dx} (u^n) = nu^{n-1} \frac{du}{dx}$$

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

$$\frac{d}{dx} [g(x)]^n = n[g(x)]^{n-1} \cdot g'(x)$$

DERIVATIVES OF INVERSE TRIGONOMETRIC FUNCTIONS

$$\frac{d}{dx} (\sin^{-1} x) = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx} (\csc^{-1} x) = -\frac{1}{x\sqrt{x^2-1}}$$

$$\frac{d}{dx} (\cos^{-1} x) = -\frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx} (\sec^{-1} x) = \frac{1}{x\sqrt{x^2-1}}$$

$$\frac{d}{dx} (\tan^{-1} x) = \frac{1}{1+x^2}$$

$$\frac{d}{dx} (\cot^{-1} x) = -\frac{1}{1+x^2}$$

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

$$\frac{d}{dx} [\ln g(x)] = \frac{g'(x)}{g(x)}$$

$$\frac{d}{dx} \ln |x| = \frac{1}{x}$$

$$e = \lim_{x \rightarrow 0} (1+x)^{1/x}$$

$$e = \lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n$$