~Exp

eg. $y = x^r \quad (r \in R)$

$$\frac{y'}{x^r} = (\ln x^r)'$$

$$= (r \ln x)'$$

$$= r \ln x'$$

$$= \frac{r}{x}$$

$$y' = r x^{r-1}. \quad (r \in R)$$

$\ln y = r \ln x$

$\frac{y'}{y} = (\ln y)' = r \cdot \frac{1}{x}$

$y' = y \cdot \frac{r}{x}$

$= x^r \cdot \frac{r}{x}$

$= r x^{r-1}.$

$$(x^r)' = r x^{r-1}, \quad r \in R$$

Review of Unit 1 / Exam 1

general F

$+, c, \times, /$

$\frac{d}{dx} f(u) = f'_{(u)} \cdot u'_{(x)}$

implicit diff (inv, log)

specific Fns

x^r, sin, cos, $\underbrace{\tan, \sec}_{\text{convenience}}$

e^x, $\ln x$, $\tan^{-1}$, $\sin^{-1}$

Chain Rule

Ex $\frac{d}{dx} \sec x$

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

$= -\frac{1}{\cos^2 x} \cdot (-\sin x)$

$= \frac{\sin x}{\cos^2 x}$ ← OK form

$= \sec x \cdot \tan x$

Ex $\frac{d}{dx} \ln \sec x$

$= \frac{(\sec x)'}{\sec x}$

$= \frac{\sec x \tan x}{\sec x}$

$= \tan x$

Ex $\frac{d}{dx} (x^{10} + 8x)^6$

OK form

$= 6(x^{10}+8x)^5 \cdot (10x^9 + 8)$

Ex

Ex $\frac{d}{dx} e^{x\tan^{-1}x}$

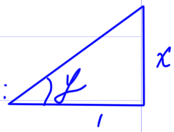
$= e^{x\tan^{-1}x} \cdot (x\tan^{-1}x)'$

$= e^{x\tan^{-1}x} \cdot [\tan^{-1}x + x \cdot (\tan^{-1}x)']$

$= e^{x\tan^{-1}x} \cdot [\tan^{-1}x + x \cdot \frac{1}{1+x^2}]$

$(\tan x)' = \sec^2 x$

$\tan y = x$:



Read backwards.

$$\lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x} = f'(x)$$

Derive formulas for

$(\sin^{-1}x)'$, $(\ln x)'$

Ex