$u = x^2$

Ex: $y = \sin(x^2)$

$y' = \cos(x^2) \cdot 2x$

$y' = 2x \cos(x^2)$

$u = \tan x$

① n) $y = \sin(\tan x)$

$y' = \cos(\tan x) \cdot \sec^2 x$

$y' = \sec^2 x [\cos(\tan x)]$

k) $y = \dfrac{1}{\sqrt{(\sec 2x - 1)^3}} = \dfrac{1}{(\sec 2x - 1)^{3/2}} = (\sec 2x - 1)^{-3/2}$

$y' = -\frac{3}{2}(\sec 2x - 1)^{-5/2} \cdot \sec 2x \tan 2x \cdot (2)$

$y' = \dfrac{-3\sec(2x)\tan(2x)}{(\sec 2x - 1)^{5/2}}$

$y' = -\dfrac{3\sec(2x)\tan(2x)}{\sqrt{(\sec 2x - 1)^5}}$

① a) $y = \tan^2(\cos x) = [\tan(\cos x)]^2$

$$y' = 2[\tan(\cos x)] \cdot \sec^2(\cos x) \cdot (-\sin x)(1)$$

$$y' = -2\sin x\,[\tan(\cos x)][\sec^2(\cos x)]$$

b) $y = \dfrac{x^2 \boxed{\tan x}}{\boxed{\sec x}} = x^2\left(\dfrac{\sin x}{\cos x}\right)\cdot\left(\dfrac{\cos x}{1}\right) = x^2 \sin x$

$$y' = x^2(\cos x)(1) + 2x(\sin x)$$

$$y' = x^2\cos x + 2x\sin x$$

$$y' = x[x\cos x + 2\sin x]$$

Final Review

① b) $f(x) = \boxed{\dfrac{2x-2}{x+3}}$ $\quad f(x+h) = \boxed{\dfrac{2x+2h-2}{x+h+3}}$

$$f'(x) = \lim_{h\to 0} \frac{\dfrac{(x+3)\cancel{(x+h+3)}(2x+2h-2)}{\cancel{x+h+3}} - \dfrac{(2x-2)\cancel{(x+3)}(x+h+3)}{\cancel{x+3}}}{h\,(x+3)(x+h+3)}$$

$$= \lim_{h\to 0} \frac{\cancel{2x^2}+\cancel{2xh}-\cancel{2x}+\cancel{6x}+6h-\cancel{6}-(\cancel{2x^2}+\cancel{2xh}+\cancel{6x}-\cancel{2x}-2h-\cancel{6})}{h(x+3)(x+h+3)}$$

$$= \lim_{h\to 0} \frac{8\cancel{h}}{\cancel{h}(x+3)(x+h+3)} = \boxed{\frac{8}{(x+3)^2}}$$