

$f(x)$	$f'(x)$
$\sin x$	$\cos x$
$\cos x$	$-\sin x$
$\tan x$	$\sec^2 x$

$f(x)$	$f'(x)$
$\csc x$	$-\csc x \cot x$
$\sec x$	$\sec x \tan x$
$\cot x$	$-\csc^2 x$

EXER 9B

① a.) $y = \cot x$

$$y = \frac{\cos x}{\sin x}$$

$$\frac{dy}{dx} = \frac{\sin x(-\cos x) - \cos x(\cos x)}{\sin^2 x}$$

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

$$\frac{dy}{dx} = -\csc^2 x$$

b.) $y = \csc x$

$$y = (\sin x)^{-1}$$

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

$$= -\frac{\cos x}{\sin^2 x}$$

$$\frac{dy}{dx} = -\csc x \cot x$$

c.) $y = \sin 3x$

$$\frac{dy}{dx} = \cos 3x \cdot 3$$

$$\frac{dy}{dx} = 3 \cos 3x$$

d.) $y = \tan(5x-3)$

$$\frac{dy}{dx} = \sec^2(5x-3) \cdot 5$$

$$\frac{dy}{dx} = 5 \sec^2(5x-3)$$

e.) $y = \cos(8-3x)$

$$\frac{dy}{dx} = -\sin(8-3x) \cdot -3$$

$$\frac{dy}{dx} = 3 \sin(8-3x)$$

f.) $y = \csc\left(\frac{x-3}{4}\right)$

$$\frac{dy}{dx} = -\csc\left(\frac{x-3}{4}\right) \cot\left(\frac{x-3}{4}\right) \cdot \frac{1}{4}$$

$$\frac{dy}{dx} = \frac{-\csc\left(\frac{x-3}{4}\right) \cot\left(\frac{x-3}{4}\right)}{4}$$

g.) $y = \cot\left(\frac{7-2x}{13}\right)$

$$\frac{dy}{dx} = -\csc^2\left(\frac{7-2x}{13}\right) \cdot \left(-\frac{2}{13}\right)$$

$$\frac{dy}{dx} = \frac{2}{13} \csc^2\left(\frac{7-2x}{13}\right)$$

$$\frac{dy}{dx} = -5x \csc^2(x+11) \cot(x+11)$$

$$\frac{dy}{dx} = -\csc^2(x+11) \cot(x+11) \cdot 5x$$

c.) $x = \csc(x+11)$

$$\frac{dy}{dx} = (-15x^2 + 11x - 1) \csc^2(x^2 - 3x + 11)$$

$$\frac{dy}{dx} = -\csc^2(x^2 - 3x + 11) \cdot (15x^2 - 11x - 1)$$

g.) $x = \cot(x^3 - 5x^2 + 11x + 13)$

$$\frac{dy}{dx} = 2x \csc^2(x-3)$$

$$\frac{dy}{dx} = \csc^2(x-3) \cdot 2x$$

h.) $x = \csc(x-3)$

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

$$\frac{dy}{dx} = -\csc^2(x) \cdot 6x$$

p.) $x = \cot(x)$

9B (cont.)

2 a.) $y = \sin(x^5 - 3)$
 $\frac{dy}{dx} = \cos(x^5 - 3) \cdot 5x^4$
 $\frac{dy}{dx} = 5x^4 \cos(x^5 - 3)$

b.) $y = \cos(e^x)$
 $\frac{dy}{dx} = -\sin(e^x) \cdot e^x$
 $\frac{dy}{dx} = -e^x \sin(e^x)$

c.) $y = \csc(x^2 + 11)$
 $\frac{dy}{dx} = -\csc(x^2 + 11) \cot(x^2 + 11) \cdot 2x$
 $\frac{dy}{dx} = -2x \csc(x^2 + 11) \cot(x^2 + 11)$

d.) $y = \cot(4x^3 - 2x^2 + 7x + 17)$
 $\frac{dy}{dx} = -\csc^2(4x^3 - 2x^2 + 7x + 17) \cdot (12x^2 - 4x + 7)$
 $\frac{dy}{dx} = (-12x^2 + 4x - 7) \csc^2(4x^3 - 2x^2 + 7x + 17)$

e.) $y = \tan(\ln(2x+1))$
 $\frac{dy}{dx} = \sec^2(\ln(2x+1)) \cdot \frac{1}{2x+1} \cdot 2$
 $\frac{dy}{dx} = \left(\frac{2}{2x+1}\right) \sec^2(\ln(2x+1))$

f.) $y = \sec(\sqrt{e^x + 1})$
 $\frac{dy}{dx} = \sec(\sqrt{e^x + 1}) \tan(\sqrt{e^x + 1}) \cdot \frac{1}{2}(e^x + 1)^{-1/2} \cdot e^x$
 $\frac{dy}{dx} = \frac{e^x \sec(\sqrt{e^x + 1}) \tan(\sqrt{e^x + 1})}{2\sqrt{e^x + 1}}$

g.) $y = \sin(\cos(\tan x))$
 $\frac{dy}{dx} = \cos(\cos(\tan x)) (-\sin(\tan x)) (\sec^2 x)$
 $\frac{dy}{dx} = -\sec x (\cos(\tan x)) (\sin(\tan x))$
 $\frac{dy}{dx} = -\frac{1}{2} \sec x \sin(2 \tan x)$
 $\frac{dy}{dx} = -\cos(\cos(\tan x)) (\sin(\tan x)) (\sec^2 x)$

$\sin 2x = 2 \sin x \cos x$

c.) $\lambda = 2x - 3$

g.) $\lambda = \tan(2x - 3)$

$\frac{dy}{dx} = \frac{\sin x \cos x}{\cos^2 x}$
 $\lambda = \frac{\sin x \cos x}{\cos^2 x}$

$\frac{dy}{dx} = -\frac{\csc x \cot x}{\csc^2 x}$
 $\lambda = -\frac{\csc x \cot x}{\csc^2 x}$

1) a) $\lambda = \cos x$

b) $\lambda = \csc x$

$\tan x$	$\sec^2 x$
$\cos x$	$-\sin x$
$2x x$	$\cos^2 x$
$f(x)$	$f'(x)$

$\csc x$	$-\csc x \cot x$
$\sec x$	$\sec x \tan x$
$\csc x$	$-\csc x \cot x$
$f(x)$	$f'(x)$