Sec. 3.6

p. 167 #1, 3, 5, 7, 11, 15, 17, 19, 30

① $y = \sin x \quad x = \frac{\pi}{4} \qquad y' = \cos x$

pt $y = \sin\frac{\pi}{4} = \frac{1}{\sqrt{2}}$ $\quad \left(\frac{\pi}{4}, \frac{1}{\sqrt{2}}\right)$ slope $y' = \cos\frac{\pi}{4} = \frac{1}{\sqrt{2}}$

$$y - \frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}}\left(x - \frac{\pi}{4}\right)$$

③ $y = \tan x \quad x = \frac{\pi}{4} \qquad y' = \sec^2 x$

pt $y = \tan\frac{\pi}{4} = 1$ $\quad \left(\frac{\pi}{4}, 1\right)$ slope $y' = \sec^2\frac{\pi}{4} = \left(\sec\frac{\pi}{4}\right)^2 = (\sqrt{2})^2 = 2$

$$y - 1 = 2\left(x - \frac{\pi}{4}\right)$$

⑤ $f(x) = \sin x \cos x$

$f'(x) = \sin x \cdot (-\sin x) + \cos x \cdot (\cos x)$

$f'(x) = -\sin^2 x + \cos^2 x$

⑦ $f(x) = \sin^2 x = \sin x \cdot \sin x$

$f'(x) = \sin x \cdot (\cos x) + \sin x \cdot (\cos x)$

$f'(x) = \sin x \cos x + \sin x \cos x$

$f'(x) = 2 \sin x \cos x$

⑪ $f(\theta) = \tan\theta \sec\theta$

$f'(\theta) = \tan\theta \cdot \sec\theta \tan\theta + \sec\theta \cdot \sec^2\theta$

$f'(\theta) = \tan^2\theta \sec\theta + \sec^3\theta$

⑮ $y = \dfrac{\sec\theta}{\theta} \qquad y' = \dfrac{\theta \cdot \sec\theta\tan\theta - \sec\theta \cdot 1}{\theta^2}$

* ⑰ $R(y) = \frac{3\cos y - 4}{\sin y}$

$$R'(y) = \frac{\sin y(-3\sin y) - (3\cos y - 4)(\cos y)}{(\sin y)^2}$$

$$= \frac{-3\sin^2 y - 3\cos^2 y + 4\cos y}{\sin^2 y}$$

$$= \frac{-3(\sin^2 y + \cos^2 y) + 4\cos y}{\sin^2 y}$$

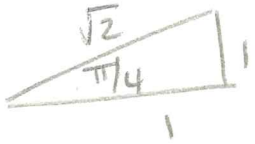
$$R'(y) = \frac{-3 + 4\cos y}{\sin^2 y}$$

⑲ $f(x) = \frac{1 + \tan x}{1 - \tan x}$

$$f'(x) = \frac{(1-\tan x)(\sec^2 x) - (1+\tan x)(-\sec^2 x)}{(1-\tan x)^2}$$

$$= \frac{\sec^2 x - \cancel{\tan x \sec^2 x} + \sec^2 x + \cancel{\tan x \sec^2 x}}{(1-\tan x)^2}$$

$$= \frac{2\sec^2 x}{(1-\tan x)^2}$$




(30) $y = \csc x - \cot x \qquad x = \frac{\pi}{4}$

pt $y = \csc\frac{\pi}{4} - \cot\frac{\pi}{4}$

$\sqrt{2} - 1$

pt $(\pi/4, \sqrt{2}-1)$

slope $y' = -\csc x\cot x + \csc^2 x$

$= -\csc\frac{\pi}{4}\cot\frac{\pi}{4} + \left(\csc\frac{\pi}{4}\right)^2$

$-\sqrt{2}\cdot 1 + (\sqrt{2})^2$

$-\sqrt{2} + 2$

$y - (\sqrt{2}-1) = (-\sqrt{2}+2)\left(x - \frac{\pi}{4}\right)$