WS 11

Derivative of Trig Functions

1) $f(x) = \sin x \cot x$

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

$f(x) = \cos x$

$f'(x) = -\sin x$

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

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

3) $g(w) = \frac{1+\sec w}{1-\sec w}$

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

4) $k(v) = \frac{\csc v}{\sec v} = \cot v$

$k'(v) = -\csc^2 v$

5) $k(x) = \sin x + 2x^3 + 4\tan x$

$k'(x) = \cos x + 6x^2 + 4\sec^2 x$

6) $F(x) = \frac{\cos x}{1-\sin x}$

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

7) $r(a) = \csc(a^3)$

$r'(a) = -3a^2 \csc(a^3)\cot(a^3)$

8) $H(s) = \cot(s^2 - 4\sqrt{s})$

$H'(s) = -(2s - \frac{2}{\sqrt{s}})\csc^2(s^2 - 4\sqrt{s})$

9) $f(x) = 5\tan(\cos x)$

$f'(x) = -5\sin x \sec^2(\cos x)$

10) $f(x) = \cos x + 3x^2$

$f'(x) = -\sin x + 6x$

11) $p(w) = \tan\sqrt{w}$

$p'(w) = \frac{1}{2\sqrt{w}} \sec^2\sqrt{w}$

12) $P(v) = \sin 3v \csc 3v$

$P'(v) = 0$

13) $N(x) = \sin x - 5\cos x$

$N'(x) = \cos x + 5\sin x$

14) $h(x) = x^3 \csc x$

$h'(x) = -x^3 \csc x \cot x + 3x^2 \csc x$

15) $L(x) = \tan x \sec x$

$L'(x) = \sec x \tan^2 x + \sec^3 x$

16) $f(x) = \sin x + 3$, $x = \pi$

point: $(\pi, 3)$

slope: $f'(x) = \cos x$, $f'(\pi) = -1$

T: $y - 3 = -1(x - \pi)$

N: $y - 3 = 1(x - \pi)$

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

point: $f(\pi) = -1$

slope: $f'(x) = \cos x - \sin x$, $f'(\pi) = -1$

N: $y + 1 = 1(x - \pi)$

18) $f(x) = \cos 2x$

$f'(x) = -2\sin 2x = 0$

$\sin 2x = 0$

$2x = \pi, 3\pi$

$\boxed{x = \frac{\pi}{2}, \frac{3\pi}{2}}$