

27.2 Derivatives of Other Trigonometric Functions

$$y = \tan u \Rightarrow y' = (\sec^2 u) u'$$

$$y = \cot u \Rightarrow y' = (-\csc^2 u) u'$$

$$y = \sec u \Rightarrow y' = (\sec u \tan u) u'$$

$$y = \csc u \Rightarrow y' = (-\csc u \cot u) u'$$

$$\sec x = \frac{1}{\cos x}$$

$$\csc x = \frac{1}{\sin x}$$

$$\cot x = \frac{1}{\tan x}$$

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$$\textcircled{4} \quad y = 3 \tan(3x+2) \Rightarrow y' = 3(\sec^2(3x+2))(3x+2)' = 3(\sec^2(3x+2)) \cdot 3 = 9 \sec^2(3x+2)$$

$$\textcircled{6} \quad y = 3 \cot 6x \Rightarrow y' = 3(-\csc^2(6x)) \cdot 6 = -18 \csc^2(6x)$$

$$\textcircled{10} \quad h = .5 \csc(1-2\pi t) \quad (1-2\pi t)' = -2\pi$$
$$h' = \frac{dh}{dt} = .5(-\csc(1-2\pi t) \cot(1-2\pi t))(-2\pi)$$
$$= \pi \csc(1-2\pi t) \cot(1-2\pi t)$$

$$\textcircled{16} \quad y = .8 \sec^3 5u \quad \text{or} \quad .8 (\sec 5u)^3$$
$$\frac{dy}{du} = .8(3)(\sec 5u)^2 (\sec 5u)'$$
$$= 2.4 \sec^2 5u \underbrace{\sec 5u \tan 5u}_{\text{red bracket}} \cdot 5$$
$$= 12.0 \sec^3 5u \tan 5u$$

$$\textcircled{22} \quad y = \left(\frac{1}{2} \sin 2x\right) (\sec x) \quad f' = \frac{1}{2} \cos 2x \cdot 2 = \cos 2x$$

$$s' = \sec x \tan x$$

$$y' = \frac{1}{2} \sin 2x \sec x \tan x + \sec x \cos 2x$$

$$\textcircled{24} \quad u = \frac{\cot 0.25z}{2z} \quad \frac{B T' - T B'}{B^2}$$

$$u' = \frac{2z (-\csc^2 \cdot 0.25z)(0.25) - (\cot \cdot 0.25z) 2}{(2z)^2}$$

$$= \frac{-0.5 \csc^2 \cdot 0.25z - 2 \cot \cdot 0.25z}{4z^2}$$

$$y = \csc(\cos 4x)$$

$$= -\csc(\cos 4x) \cot(\cos 4x) (\cos 4x)'$$

$$= -\csc(\cos 4x) \cot(\cos 4x) (-\sin 4x) \cdot 4$$

$$= 4 \sin 4x \csc(\cos 4x) \cot(\cos 4x)$$