

$$8. y = 2 \csc x + 5 \cos x \Rightarrow y' = -2 \csc x \cot x - 5 \sin x$$

$$12. f(t) = \frac{2t}{4+t^2} \stackrel{\text{QR}}{\Rightarrow} f'(t) = \frac{(4+t^2)(2) - (2t)(2t)}{(4+t^2)^2} = \frac{8+2t^2-4t^2}{(4+t^2)^2} = \frac{8-2t^2}{(4+t^2)^2}$$

$$18. y = \frac{cx}{1+cx} \Rightarrow y' = \frac{(1+cx)(c) - (cx)(c)}{(1+cx)^2} = \frac{c+c^2x-c^2x}{(1+cx)^2} = \frac{c}{(1+cx)^2}$$

$$26. f(x) = \frac{ax+b}{cx+d} \Rightarrow f'(x) = \frac{(cx+d)(a) - (ax+b)(c)}{(cx+d)^2} = \frac{acx+ad-acx-bc}{(cx+d)^2} = \frac{ad-bc}{(cx+d)^2}$$

$$39. \frac{d}{dx}(\cot x) = \frac{d}{dx}\left(\frac{\cos x}{\sin x}\right) = \frac{(\sin x)(-\sin x) - (\cos x)(\cos x)}{\sin^2 x} = -\frac{\sin^2 x + \cos^2 x}{\sin^2 x} = -\frac{1}{\sin^2 x} = -\csc^2 x$$