1. $y = \underbrace{(x^2+3)^4}_{f(x)}\underbrace{(4x-5)^3}_{g(x)}$

$f'(x) = 4(x^2+3)^3(2x)$

$g'(x) = 3(4x-5)^2(4)$

$y' = f'(x)g(x) + f(x)g'(x)$

Feb 20-9:24 AM

2. $y = \left(\frac{1+x^2}{1-x^2}\right)^{10}$

$f(x) = x^{10}$

$f'(x) = 10x^9$

$g(x) = \frac{1+x^2}{1-x^2}$

$y'(x) = \frac{2x(1-x^2)-(1+x^2)(-2x)}{(1-x^2)^2}$

$y' = f'(g(x))\,g'(x)$

$= 10\left(\frac{1+x^2}{1-x^2}\right)^9\left[\frac{2x(1-x^2)-(1+x^2)(-2x)}{(1-x^2)^2}\right]$

$= 10\left(\frac{1+x^2}{1-x^2}\right)^9\left[\frac{2x-2x^3+2x+2x^3}{(1-x^2)^2}\right]$

$= 10\left(\frac{1+x^2}{1-x^2}\right)^9\left[\frac{4x}{(1-x^2)^2}\right]$

$= 10\,\frac{(1+x^2)^9}{(1-x^2)^9}\,\frac{4x}{(1-x^2)^2}$

$= \frac{40x(1+x^2)^9}{(1-x^2)^{11}}$

Feb 20-9:11 AM

4. $y = \underbrace{(x^2+3)^3}_{f(x)}\underbrace{(x^3+3)^2}_{g(x)}$

$f'(x) = 3(x^2+3)^2(2x)$

$g'(x) = 2(x^3+3)(3x^2)$

Feb 20-9:53 AM

10. $y = x\sqrt{x^2+1}$

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

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

$y' = (1)\sqrt{x^2+1} + x\left[\frac{x}{\sqrt{x^2+1}}\right]$

$= \sqrt{x^2+1} + \frac{x^2}{\sqrt{x^2+1}}$

$= \frac{\sqrt{x^2+1}\sqrt{x^2+1}}{\sqrt{x^2+1}} + \frac{x^2}{\sqrt{x^2+1}}$

$= \frac{x^2+1+x^2}{\sqrt{x^2+1}}$

$= \frac{2x^2+1}{\sqrt{x^2+1}}$

Feb 20-9:44 AM