1- $f(x) = (x^2-2)^2$

$f'(x) = 4x(x^2-2)$

2- $f(x) = (4x-3)^2$ $\quad f'(x) = 8(4x-3)$

3- $f(x) = (2\sqrt{x}-1)(4x+1)^{-1}$

$f'(x) = (4x+1)^{-2}\left(\frac{1}{\sqrt{x}}(4x+1) - 4(2\sqrt{x}-1)\right)$

$= \frac{4x+1-8x+4\sqrt{x}}{\sqrt{x}(4x+1)^2}$

$= \frac{1-4x+4\sqrt{x}}{\sqrt{x}(4x+1)^2}$

4- $f(x) = x^2\sqrt{1-x^2}$

$f'(x) = 2x\sqrt{1-x^2} - \frac{x^3}{\sqrt{1-x^2}}$

$= \frac{2x-2x^3-x^3}{\sqrt{1-x^2}}$

$= \frac{2x-3x^3}{\sqrt{1-x^2}}$

5- $f(x) = \frac{x}{\sqrt[3]{x^2+4}} = x(x^2+4)^{-1/3}$

$f'(x) = \frac{-1}{(x^2+4)^{4/3}}\left(x^2+4-\frac{2}{3}x^2\right)$

$= \frac{x^2+12}{3(x^2+4)^{4/3}}$

#6 $y = \left(\frac{3x-1}{x^2+3}\right)^2$

$y' = 2\left(\frac{3x-1}{x^2+3}\right)\frac{3x^2+9-6x^2+2x}{(x^2+3)^2}$

$= \frac{2(3x-1)(-3x^2+2x+9)}{(x^2+3)^3}$

#7 $f(t) = \sin^3 4t$

$f'(t) = 12\sin^2 4t \cos 4t$

#8 $y = 3(4-9x)^4$

$y' = -108(4-9x)^3$

#9 $y = \sqrt[3]{6x^2+1}$

$y' = \frac{4x}{(6x^2+1)^{2/3}}$

#10 $y = \left(\frac{1}{x-3}\right)^2$ $\quad y' = \frac{-2}{(x-3)^3}$

#11 $y = \frac{1}{\sqrt{x+2}}$ $\quad y' = \frac{1}{2(x+2)^{3/2}}$

#12 $f(x) = x^3(x-4)^5$

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

$= x^2(x-4)^4(8x-12)$

#13 $f(x) = \frac{x}{\sqrt{x^2+1}} = x(x^2+1)^{-1/2}$

$f'(x) = \frac{1}{(x^2+1)^{3/2}}(x^2+1-x^2) = \frac{1}{(x^2+1)^{3/2}}$

#14 $g(t) = \sqrt{\frac{1}{t^2-2}} = \frac{1}{(t^2-2)^{1/2}}$

$g'(t) = \frac{t}{(t^2-2)^{3/2}}$

#15 $y = \frac{1}{2}x^2\sqrt{16-x^2}$

$y' = \frac{1}{2}\frac{x}{\sqrt{16-x^2}}\left(16-x^2-\frac{1}{2}x^2\right)$

$= \frac{x(8-x^2)}{\sqrt{16-x^2}}$

#16 $f(x) = \left(\frac{x^2}{x^3+2}\right)^2 = x^4(x^3+2)^{-2}$

$f'(x) = \frac{x^3}{(x^3+2)^3}\left(4x^3+8-6x^6\right)$

#17 $f(x) = \left(\frac{3x^2-2}{2x+3}\right)^3 = (3x^2-2)^3(2x+3)^{-3}$

$f'(x) = \frac{(3x^2-2)^2}{(2x+3)^4}\left(18x(2x+3)-6(3x^2-2)\right)$

$= \frac{(3x^2-2)^2(18x^2+54x+12)}{(2x+3)^4}$

#18 $h(x) = \sin 2x \cos 2x$

$= \frac{1}{2}\sin 4x$

$h'(x) = 2\cos 4x$

#19 $f(x) = \frac{\cot x}{\sin x}$

$f'(x) = \frac{-\csc^2 x \sin x - \cos x \cot x}{\sin^2 x}$

$= \frac{-\csc x - \sin x}{\sin^2 x} = -\frac{1+\sin^2 x}{\sin^3 x}$

#20 $f(\theta) = \tan^2 5\theta$

$f'(\theta) = 10 \tan 5\theta \sec^2 5\theta$

#21 $f(x) = \sqrt{x} + \frac{1}{4} \sin(2x)^2$

$f'(x) = \frac{1}{2\sqrt{x}} + 2x \cos(2x)^2$

#22 $y = \sin(\tan 2x)$

$y' = 2 \sec^2 2x \cos(\tan 2x)$

#23 $y = \cos(1-2x)^2$

$y' = +4x(1-2x) \sin(1-2x)^2$

#24 $h(t) = 2 \cot^2(\pi t + 2)$

$h'(t) = -4\pi \cot(\pi t+2) \csc^2(\pi t+2)$

#25 $y = \sin \sqrt[3]{x} + \sqrt[3]{\sin x}$

$y' = \frac{1}{3x^{2/3}} \cos \sqrt[3]{x} + \frac{1}{3} \frac{\cos x}{(\sin x)^{2/3}}$

#26 $y = \cos \sqrt{\sin(\tan \pi x)}$

$y' = \frac{-\pi \sec^2 \pi x \cos(\tan \pi x)}{2\sqrt{\sin(\tan \pi x)}} \sin \sqrt{\sin(\tan \pi x)}$

#27 $f(x) = ((x^2+3)^5 + x)^2$

$f'(x) = 2((x^2+3)^5 + x)(10x(x^2+3)^4 + 1)$

#28 $f(x) = (2x+5)^2(x^4-3)^3(x^2-5x+2)^6$

$f'(x) = (2x+5)(x^4-3)^2(x^2-5x+2)^5\Big[4(x^4-3)(x^2-5x+2)$
$+12x^3(2x+5)(x^2-5x+2)$
$+6(2x-5)(2x+5)(x^4-3)\Big]$

$= (2x+5)(x^4-3)^2(x^2-5x+2)^5$

x^6	x^5	x^4	x^3	x^2	x^1	x^0
4	−20	8	120	−12	60	−24
24	−120	48		72		450
24	60	300				
		−150				

$= (2x+5)(x^4-3)^2(x^2-5x+2)^5(52x^6-80x^5+206x^4+12x^3$
$-60x^2+60x+426)$

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#28 $f(x) = \dfrac{(3x^2-1)^4(5-8x)^3}{(x^3-2x+1)^2}$

$f'(x) = \dfrac{(3x^2-1)^3(5-8x)^2}{(x^3-2x+1)^3}\Big[24x(5-8x)(x^3-2x+1)$
$-24(3x^2-1)(x^3-2x+1)$
$-(6x^2-4)(3x^2-1)(5-8x)\Big]$
$(-18x^4+18x^2-4)$

$= \dfrac{(3x^2-1)^3(5-8x)^2}{(x^3-2x+1)^3}$

x^5	x^4	x^3	x^2	x^1	x^0
−192	120	384	−240	120	24
−72	−90	144	−192	−48	−20
144		24	−72	32	
		−144	90		

$= \dfrac{(3x^2-1)^3(5-8x)^2(-120x^5+30x^4+408x^3-414x^2+104x+4)}{(x^3-2x+1)^3}$

#30 $y = \sec\left(\frac{x^2+1}{x^4+2}\right)^3$

$$y' = 3\left(\frac{x^2+1}{x^4+2}\right)^2 \left(\frac{2x^5+4x-4x^5-4x^3}{(x^4+2)^2}\right) \sec\left(\frac{x^2+1}{x^4+2}\right)^3 \tan\left(\frac{x^2+1}{x^4+2}\right)^3$$

$$= \frac{3(x^2+1)^2(4x-2x^5-4x^3)}{(x^4+2)^4} \sec\left(\frac{x^2+1}{x^4+2}\right)^3 \tan\left(\frac{x^2+1}{x^4+2}\right)^3$$