1A) $f(x) = \sqrt{x} + \frac{3}{\sqrt[3]{x^4}} + 5\csc x$

$f(x) = x^{\frac{1}{2}} + 3x^{-\frac{4}{3}} + \frac{5}{\sin x}$

$f'(x) = \frac{1}{2}x^{-\frac{1}{2}} - 4x^{-\frac{7}{3}} + \frac{(\sin x)\cdot 0 - 5\cos x}{\sin^2 x}$

$f'(x) = \frac{1}{2\sqrt{x}} - \frac{4}{\sqrt[3]{x^7}} - \frac{5\cos x}{\sin^2 x}$

$\frac{5\cos x}{\sin^2 x} = 5 \cdot \frac{\cos x}{\sin x} \cdot \frac{1}{\sin x}$

$= 5\cot x \cdot \csc x$

1B) $g(x) = \frac{5x^4 + 7x^3 - 14}{2x^3} = \frac{5x^4}{2x^3} + \frac{7x^3}{2x^3} - \frac{14}{2x^3}$

$= \frac{5}{2}x + \frac{7}{2} - 7x^{-3}$

$g'(x) = \frac{5}{2} + 21x^{-4} = \frac{5}{2} + \frac{21}{x^4}$

2D) $f(x) = x^2 \sin x$

$f'(x) = x^2 \cos x + \sin x \cdot 2x$

$= x\left(x\cos x + 2\sin x\right)$

3B) $g(x) = \frac{e^{5x}}{(\sin x)^2}$

$g'(x) = \frac{(\sin x)^2 \cdot 5e^{5x} - e^{5x} \cdot 2(\sin x)^1 \cos x}{(\sin x)^4}$

$g'(x) = \frac{5e^{5x}(\sin x)^2 - 2e^{5x}\sin x \cos x}{(\sin x)^4}$

$g'(x) = \frac{e^{5x} \cdot \sin x\left(5\sin x - 2\cos x\right)}{(\sin x)^{4-3}}$

$g'(x) = \frac{e^{5x}(5\sin x - 2\cos x)}{\sin^3 x}$

2A) $f(x) = (5x^3+2)^4(6x^2-1)^5$

$\frac{d}{dx}\left((f(x))^n\right) = n(f(x))^{n-1}\cdot f'(x)$

$f'(x) = \overbrace{(5x^3+2)^4}^{\text{1st}}\cdot \overbrace{5(6x^2-1)^4\cdot 12x}^{\text{der 2nd}} + \overbrace{(6x^2-1)^5}^{\text{2nd}}\cdot \overbrace{4(5x^3+2)^3\cdot 15x^2}^{\text{der 1st}}$

$f'(x) = 60x(5x^3+2)^4(6x^2-1)^4 + 60x^2(6x^2-1)^5(5x^3+2)^3$

$f'(x) = 60x(5x^3+2)^3(6x^2-1)^4\left[(5x^3+2) + x(6x^2-1)\right]$

$5x^3+2+6x^3-x$

$f'(x) = 60x(5x^3+2)^3(6x^2-1)^4(11x^3-x+2)$

2C) $y = 5^{3x}\cos 2x$

$y' = 5^{3x}\cdot(-\sin 2x)\cdot 2 + \cos 2x\cdot 5^{3x}\cdot \ln 5\cdot 3$

$y' = 5^{3x}\left(-2\sin 2x + 3\cos 2x\cdot \ln 5\right)$

2A) $f(x) = (5x^3+2)^4(6x^2-1)^5$

$f'(x) = \overbrace{(5x^3+2)^4}^{\text{1st}}\cdot \overbrace{5(6x^2-1)^4\cdot 12x}^{\text{der 2nd}} + \overbrace{(6x^2-1)^5}^{\text{2nd}}\cdot \overbrace{4(5x^3+2)^3\cdot 15x^2}^{\text{der 1st}}$

$f'(x) = \underbrace{60x(5x^3+2)^4(6x^2-1)^4}_{60x(5x^3+2)^3(6x^2-1)^4} + \underbrace{60x^2(5x^3+2)^3(6x^2-1)^5}_{60x(5x^3+2)^3(6x^2-1)^4}$

$60AB^4C^4 + 60A^2B^3C^5$

$60AB^3C^4(B + AC)$

$f'(x) = \underbrace{60x(5x^3+2)^3(6x^2-1)^4}_{\text{GCF}}\left[(5x^3+2) + x(6x^2-1)\right]$

$5x^3+2+6x^3-x$

$$f'(x) = 60x(5x^3+2)^3(6x^2-1)^4(11x^3-x+2)$$

3B) $g(x) = \dfrac{e^{5x}}{(\sin x)^2}$

bot, der top, top, der bot

$$g'(x) = \frac{(\sin x)^2 \cdot 5e^{5x} - e^{5x} \cdot 2(\sin x)\cdot \cos x}{(\sin x)^4}$$

$$g'(x) = \frac{5e^{5x}(\sin x)^2 - 2e^{5x}\sin x \cos x}{(\sin x)^4}$$

$$g'(x) = \frac{e^{5x}(\sin x)(5\sin x - 2\cos x)}{(\sin x)^{4\,3}}$$

$$g'(x) = \frac{e^{5x}(5\sin x - 2\cos x)}{\sin^3 x}$$