

$$\begin{aligned} \textcircled{15} \quad g(z) &= \left(z^2 - \frac{1}{z^2} \right)^6 \\ g'(z) &= 6 \left(z^2 - z^{-2} \right)^5 \left(2z + 2z^{-3} \right) \\ g'(z) &= 12 \left(z^2 - z^{-2} \right)^5 \left(z + z^{-3} \right) \frac{z^3}{z^3} \\ g'(z) &= 12 \left(\frac{z^4 - 1}{z^2} \right)^5 \left(\frac{z^4 + 1}{z^3} \right) \end{aligned}$$

$$\begin{aligned} \textcircled{17} \quad h(u) &= \frac{(u^2+1)^3}{(4u-5)^5} \\ \frac{(4u-5)^5 (3(u^2+1)^2 (2u)) - (u^2+1)^3 (5(4u-5)^4 (4))}{(4u-5)^{10}} \\ &= \frac{6u(4u-5)^5 (u^2+1)^2 - 20(u^2+1)^3 (4u-5)^4}{(4u-5)^{10}} \\ &= \frac{2(4u-5)^4 (u^2+1)^2 [3u(4u-5) - 10(u^2+1)]}{(4u-5)^{10}} \\ &= \frac{2(u^2+1)^2 [12u^2 - 15u - 10u^2 - 10]}{(4u-5)^{10}} \\ &= \frac{2(u^2+1)^2 (2u^2 - 15u - 10)}{(4u-5)^{10}} \end{aligned}$$

$$\begin{aligned} \textcircled{19} \quad f'(x) &= 2 \left(\frac{3x^2-5}{2x^2+7} \right) \cdot \frac{(2x^2+7)(1x) - (3x^2-5)(4x)}{(2x^2+7)^2} \\ &= \frac{2(3x^2-5)(2x)(3(2x^2+7) - 2(3x^2-5))}{(2x^2+7)^3} \\ &= \frac{4x(3x^2-5)(6x^2+21-6x^2+10)}{(2x^2+7)^3} \\ &= \frac{4x(3x^2-5)(31)}{(2x^2+7)^3} \\ &= \frac{124x(3x^2-5)}{(2x^2+7)^3} \end{aligned}$$