1. $x^5 = 5x^4$

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

3. $\frac{1}{t^3} = t^{3} = -3t^{-4} = \frac{-3}{t^4}$

4. $\frac{4}{u^4} = 4u^{-4} = -16u^{-5} = \frac{-16}{u^5}$

5. $\frac{1}{5u^5} = \frac{1}{5}u^{-5} = -u^{-6} = -\frac{1}{u^6}$

6. $\frac{x^3}{7} = \frac{1}{7}x^{1} = x^{6}$

7. $\frac{1}{\sqrt[3]{x^2}} = x^{-\frac{2}{3}} = -\frac{2}{3}x^{-\frac{5}{3}} = \frac{-2}{3x^{\frac{5}{3}}} = \frac{-2}{3x\sqrt[3]{x^2}}$

8. $2x - x^3 = 2 - 3x^2$

9. $4x^3 - 3x^2 + 7 = 12x^2 - 6x$

10. $5 - 2x^2 + x^4 = -4x + 4x^3$

11. $3x^4 - 7x^3 + 5x^2 + 8 = 12x^3 - 21x^2 + 10x$

12. $4x^3 + 2 + \frac{1}{x} = 12x^2 - x^{-2} = 12x^2 - \frac{1}{x^2} = \frac{12x^4 - 1}{x^2}$

13. $3u^2 + \frac{3}{u^2} = 3u^2 + 3u^{-2} = 6u - 6u^{-3} = 6u - \frac{6}{u^3} = \frac{6u^4 - 6}{u^3}$

14. $\frac{x^6}{6} + \frac{6}{x^6} = \frac{1}{6}x^6 + 6x^{-6} = x^5 - 36x^{-7} = x^5 - \frac{36}{x^7} = \frac{x^{12} - 36}{x^7}$

15. $x^{1.2} + \frac{1}{x^{0.6}} = x^{6/5} + x^{\frac{-3}{5}} = \frac{6}{5}x^{\frac{1}{5}} - \frac{3}{5}x^{\frac{-8}{5}} = \frac{6}{5}\sqrt[5]{x} - \frac{3}{5x\sqrt[5]{x^3}}$

16. $2\sqrt{x} + 2/\sqrt{x} = 2x^{\frac{1}{2}} + 2x^{-1/2} = x^{-1/2} - x^{-3/2} = \frac{1}{\sqrt{x}} - \frac{1}{x\sqrt{x}}$

17. $x^7 + \frac{1}{x^7} + 7x + \frac{7}{x} + 7 = 7x^6 - 7x^{-8} + 7 - 7x^{-2} = 7x^6 - \frac{7}{x^8} + 7 - \frac{7}{x^2}$

19. $2\sqrt{x^3} + \frac{2}{\sqrt{x^3}} = 2x^{3/2} + 2x^{-3/2} = 3x^{\frac{1}{2}} - 3x^{-5/2}$
$= 3\sqrt{x} - \frac{3}{x^2\sqrt{x}}$

20. $2\sqrt{t} - \frac{3}{\sqrt[3]{t}} = 2t^{\frac{1}{2}} - 3t^{1/3} = t^{-1/2} - t^{-2/3}$
$= \frac{1}{\sqrt{t}} - \frac{1}{\sqrt[3]{t^2}}$

21. $2x^{3/2} + 4x^{5/2} = 3x^{1/2} + 10x^{3/2} = 3\sqrt{x} + 10\sqrt[3]{x^2}$

22. $\sqrt[3]{x} - \frac{1}{\sqrt[3]{x}} = x^{\frac{1}{3}} - x^{-\frac{1}{3}} = \frac{1}{3}x^{-2/3} + \frac{1}{3}x^{-4/3}$
$= \frac{1}{3\sqrt[3]{x^2}} + \frac{1}{3x^{1}\sqrt[3]{x}}$

23. $3x^4 + (2x-1)^2 = 12x^3 + [2(2x-1).(2)] = 12x^3 + 8x - 4$

24. $(y-2)(2y-3) = (y-2)(2) + (2y-3)(1)$
$= 2y - 4 + 2y - 3 = 4y - 7$

25. $(x-7)(2x-9) = (x-7)(2) + (2x-9)(1)$
$= 2x - 14 + 2x - 9 = 4x - 23$

1 $y(x+1)(x^3+3) : y' = (x+1)(3x^2) + (x^3+3)(1) = 4x^3 + 3x^2 + 3$

2 $y(x^3+6x^2)(x^2-1) = y' = (x^3+6x^2)(2x) + (x^2-1)(3x^2+12x)$

3 $y(7x+1)(2-3x) = y' = (7x+1)(-3) + (2-3x)(7)$

4 $y(x^2+7x)(x^2+3x+1) = y' = (x^2+7x)(2x+3) + (x^2+3x+1)(2x+7)$

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

6 $f(x) = (x^2+1)(x+1)^2 = [(x^2+1)\cdot 2(x+1).1] + (x+1)^2(2x)$

$f'(x) = (x^2+1)(2x+2) + (x+1)^2(2x)$

7 $f(x) = (3x+7)(x-1)^2 = f'(x) = (3x+7).2(x-1)(1) + (x-1)^2(3)$

$f'(x) = (3x+7)(2x-2) + (x-1)(3)$

8. $y = (t^2+1)(t - \frac{1}{t}) = y' = (t^2+1)(1+t^{-2}) + (t - \frac{1}{t})(2t)$

$y' = (t^2+1)(1 + \frac{1}{t^2}) + (t - \frac{1}{t})(2t)$

9. $f(x) = (y + \frac{3}{y})(y^2-5) = f'(x) = (y + 3y^{-2})(2y) + (y^2-5)(1-3y^{-1})$

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

10 $f(t) = (t + \frac{1}{t})(5t^2 - \frac{1}{t^2}) = f'(t) = (t + \frac{1}{t})(10t + 2t^{-2})(5t^2 - \frac{1}{t^2})(1-t^2)$

$f'(t) = (t + \frac{1}{t})(10t + \frac{2}{t^3}) + (5t^2 - \frac{1}{t^2})(1 - \frac{1}{t^2})$

11. $f(x) = (x^2+1)(3x-1)(2x-3) = f'(x) = u'\cdot v\cdot w + u\cdot v'\cdot w + u\cdot v\cdot w$

$f'(x) = (2x)(3x-1)(2x-3) + (x^2+1)(3)(2x-3) + (x^2+1)(3x-1)(2)$

12. $f(x) = (2x+1)(3x^2+1)(x^3+7) = f'(x) = (2)(3x^2+1)(x^3+7) + 6x(2x+1)(x^3+7) + 3x^2(2x+1)$

$(3x^2+5$

19. $y = \frac{3}{2x+7} = y' = \frac{(2x+7)(0) - 3(2)}{(2x+7)^2} = \frac{-6}{(2x+7)^2}$

20. $$f(t) = \frac{5t}{2-3t} = f'(t) = \frac{(2-3t)(5)-(5t)(-3)}{(2-3t)^2} = \frac{10}{(2-3t)^2}$$

21. $$y = \frac{u}{u+1} = y' = \frac{(u+1)(1)-u(1)}{(u+1)^2} = \frac{1}{(u+1)^2}$$

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

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

24. $$g(x) = \frac{3-x}{x^2-3} = g'(x) = \frac{(x^2-3)(-1)-(3-x)(2x)}{(x^2-3)^2} = \frac{x^2-6x+3}{(x^2-3)^2}$$

25. $$y = \frac{t^2-7t}{t-5} = y' = \frac{(t-5)(2t-7)-(t^2-7t)(1)}{(t-5)^2} = \frac{t^2-10t+35}{(t-5)^2}$$

26. $$y = \frac{u^2-u+1}{u^2+u+1} = y' = \frac{(u^2+u+1)(2u-1)-(u^2-u+1)(2u+1)}{(u^2+u+1)^2}$$

7. $h(t) = \sqrt{t^2 + a^2} = (t^2 + a^2)^{1/2} = h'(t) = \frac{1}{2}(t^2 + a^2)^{-1/2} \cdot (2t + 2a)$

$h' = (t) = (2t + 2a)\left(\frac{1}{2\sqrt{t^2 + a^2}}\right)$

8. $F(x) = \sqrt[3]{x^3 + 3x} = F'(x) = \frac{1}{3}(x^3 + 3x)^{-2/3} \cdot (3x^6 + 3)$

9. $x = \frac{1}{\sqrt[3]{(t^3 + 1)}} = x' = \frac{1}{(t^3 + 1)^{1/3}} = (t^3 + 1)^{-1/3} = -\frac{1}{3}(t^3 + 1)^{-4/3} \cdot (3t^2)$

$= \frac{-3t^2}{3}(t^3 + 1)^{-4/5} = \frac{-t^2}{(t^3 + 1)^{4/3}}$

10. $y = (t + \frac{1}{t})^{10} = y' = 10(t + \frac{1}{t})^9 \cdot (1 - t^{-2})$

11. $y = (t^2 + \frac{1}{t^2})^5 = y' = 5(t^2 + \frac{1}{t^2})^4 \cdot (2t - 2t^{-3})$

12. $y = \frac{1}{\sqrt{u^2 + a}} = y' = u^2 + a)^{-1/2} = -\frac{1}{2}(u^2 + 9)^{-3/2} \cdot (2u)$

$= \frac{-2u}{2}(u^2 + 9)^{-3/2} = -\frac{u}{(u^2 + 9)^{3/2}}$

13. $y = (x^2 + 1)^{0.6} = y^{\frac{1}{2}}(x^2 + 1)^{3/5} = \frac{3}{5}(x^2 + 1)^{-2/5} \cdot (2x) = y' = \frac{6x}{5(x^2 + 1)^{2/5}}$

14. $y = \sqrt{x + \frac{1}{x^2}} = y' = (x + \frac{1}{x^6})^{1/2} = \frac{1}{2}(x + \frac{1}{x^2})^{-1/2} \cdot (1 - 2x^{-3})$

15. $u\sqrt[3]{t^3 - \frac{1}{t^5}} = u' = (t^3 - \frac{1}{t^3})^{1/3} = \frac{1}{3}(t^3 - \frac{1}{t^3})^{-2/3} \cdot (3t^2 + 3t^{-4})$

16. $y = \sqrt{1 + x\ln 2} = y' = \frac{1}{2}(1 + x\ln 2)^{-1/2} \cdot (\ln 2) \quad y' = \frac{\ln 2}{2(1 + x\ln 2)^{1/2}}$

17. $f(x) = \frac{\sqrt{x^2 + 1}}{\sqrt[3]{x^2 + 1}} = f'(x) = (x^2 + 1)^{1/3} \cdot \frac{1}{2}(x^2 + 1)^{-1/2}(2x) - (x^2 + 1)^{1/2} \cdot \frac{2}{3}(x^2 + 1)^{-1/3}(2x$

18. $g(x = (x^4 + 16)^{14} = g'(x) = 14(x^4 + 16)^{13} \cdot (4x^3)$

19. $G(u) = (u^2 + 1)^3(2u + 1) = G'(u) = (u^2 + 1)^3(2) + (2u + 1) \cdot 3(u^2 + 1)^2(2u)$

20. $H(y) = (2y^2 + 3)^6(5y + 5) = H'(y) = (2y^2 + 3)^6(5) + (5y + 5) \cdot 6(2y^2 + 3)^5(4y)$

21. $y = \left(\frac{3x + 2}{x - 1}\right)^7 = y' = \frac{(x - 1)^7 \cdot 7(3x + 2)^6(3) - (3x + 2)^7 \cdot 7(x - 1)^6}{((x - 1)^7)^2}$

28. $y = \left(\frac{t}{t+1}\right)^6 = y' = \frac{t^6}{t+1)^6} = \frac{(t+1)^6 \cdot 6t^5 - t^6 \cdot 6(t+1)^5}{((t+1)^6)^2}$

29. $y = \left(\frac{u^2+1}{u+1}\right)^3 = y' = \frac{(u+1)^3 \cdot 3(u^2+1)^2(2u) - (u^2+1)^3 \cdot 3(u+1)^2}{((u+1)^3)^2}$

30. $y = \sqrt{\frac{3x+7}{5+2x}} = \frac{(3x+7)^{1/2}}{(5+2x)^{1/2}} = y' = \frac{(5+2x)^{1/2} \cdot \frac{1}{2}(3x+7)^{-1/2} \cdot 3 - (3x+7)^{1/2} \cdot \frac{1}{2}(5+2x)^{-1/2} \cdot 2}{((5+2x)^{1/2})^2}$