Lessons 3-3 and 4-4 Rules Part 1 Key

Lessons 3-3 & 4-4 Part 1 HW Key

pp. 126 – 127 / 5, 7, 16, 17, 21, 22, 23, 26, 30, 34, 37, 40, 46, 53, 54

p. 186 / 1, 8, 20, 30

5. $y = \frac{1}{3}x^3 + \frac{1}{2}x^2 + x$

$\boxed{\frac{dy}{dx} = x^2 + x + 1}$

7. $y' = 3x^2 - 4x + 1$

$0 = 3x^2 - 4x + 1$

$0 = (3x - 1)(x - 1)$

$\boxed{x = \frac{1}{3} \quad x = 1}$

16. $y = (x^2+1)(x^3+1)$

$= x^5 + x^3 + x^2 + 1$

$\boxed{\frac{dy}{dx} = 5x^4 + 3x^2 + 2x}$

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

$= \frac{6x - 4 - 6x - 15}{(3x-2)^2}$

21. $y = \frac{x^2}{1 - x^3}$

$\frac{dy}{dx} = \frac{2x(1-x^3) - x^2(-3x^2)}{(1-x^3)^2}$

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

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

22. $y = \frac{x^2 + 3x + 2}{x^2 - 3x + 2}$

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

$= \boxed{\frac{12 - 6x^2}{(x^2-3x+2)^2}}$

23. a. $u' \cdot v + u \cdot v'$

$-3 \cdot -1 + 5 \cdot 2 = \boxed{13}$

b. $\frac{u' \cdot v - v' \cdot u}{v^2}$

$\frac{-3 \cdot -1 - 2 \cdot 5}{(-1)^2} = \boxed{-7}$

c. $\frac{v' \cdot u - u' \cdot v}{u^2}$

$\frac{2 \cdot 5 - -3 \cdot -1}{25} = \frac{10 - 3}{25} = \boxed{\frac{7}{25}}$

d. $7 \cdot v' - 2 \cdot u' = 7 \cdot 2 - 2 \cdot -3 = \boxed{20}$

26. $3x - 2y + 12 = 0$

$-2y = -3x - 12$

$y = \boxed{\frac{3}{2}}x + 6$ → m

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

$y' = -x^{-5} + x^{-4} - x^{-3} + x^{-2}$

$= \boxed{-\frac{1}{x^5} + \frac{1}{x^4} - \frac{1}{x^3} + \frac{1}{x^2}}$

Lessons 3-3 and 4-4 Rules Part 1 Key

34. $y' = 2x + 1$

$y'' = 2$

$y''' = 0$

$y^{(4)} = 0$

37. $y' = 3x^2 - 3$

$m_{T.L.} = 3(2)^2 - 3 = 9$

$m_{N.L.} = -\frac{1}{9}$

$\boxed{y - 3 = -\frac{1}{9}(x - 2)}$

42. $y' = \frac{(4+x^2)(0) - 8(2x)}{(4+x^2)^2}$

$y' = \frac{-16x}{(4+x^2)^2}$

$y'(2) = \frac{-16(2)}{(4+2^2)^2} = \frac{-1}{2}$

$\boxed{y - 1 = -\frac{1}{2}(x - 2)}$

46. $\frac{dP}{dv} = \frac{(nRT)(1) - (V-nb)(0)}{(V-nb)^2} - \frac{(an^2)2V - V^2(0)}{V^4}$ switch . . . .

$= \boxed{-\frac{nRT}{(V-nb)^2} - \frac{2an^2}{V^3}}$

53. False. π is a constant.

$\frac{d\pi^3}{dx} = 0$

54. True, $f'(x) = -\frac{1}{x^2}$

$-\frac{1}{x^2}$ will never = zero

$\therefore$ no H.T.L.

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1. $\frac{dy}{dx} = 2 \cdot e^x = \boxed{2e^x}$

8. $\frac{dy}{dx} = 2xe^x + x^2e^x - (e^x + xe^x)$

$= \boxed{xe^x + x^2e^x - e^x}$

20. $\frac{dy}{dx} = 1 \cdot \ln x + x \cdot \frac{1}{x} - 1$

$= \ln x + 1 - 1$

$= \boxed{\ln x}$

30. $y = -3x + 2$

$m = -3$

$\perp m = \frac{1}{3}$

$y = 2e^x - 1$

$y' = 2e^x$

$2e^x = \frac{1}{3}$

$e^x = \frac{1}{6}$

$\ln e^x = \ln \frac{1}{6}$

$x = \ln \frac{1}{6} \approx -1.792$

plug into $y = 2e^x - 1$

$\boxed{(-1.792, -.667)}$