Math 1325 149 BusCAL

04-30-18

1. $A = P\left(1+\frac{r}{N}\right)^{Nt}$

$\$500000 = P\left(1+\frac{.09}{1}\right)^{1(30)}$

$\$500000 = P(1+.09)^{30}$

$\$500000 = P(1.09)^{30}$

$\frac{\$500000}{(1.09)^{30}} = \frac{P(1.09)^{30}}{(1.09)^{30}}$

use graphing calculator

$\$37685.56806 = P$

$\$37,685.57 = P$

34. Use the product rule to find the derivative

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

formula
$y = f \cdot g$
$y' = f'g + fg'$

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

$y' = (8x+0)(2x-5) + (4x^2+3)(2-0)$

$y' = (8x)(2x-5) + (4x^2+3)(2)$

$y' = 16x^2 - 16x + 8x^2 + 6$

$y' = 24x^2 - 16x + 6$

35. Differentiate

$F(x) = (4x+1)^2$

$F'(x) = 2(4x+1)^{2-1} \cdot (4x+1)'$

$F'(x) = 2(4x+1)^1 \cdot (4+0)$

$F'(x) = 2(4x+1) \cdot (4)$

$F'(x) = 8(4x+1)$

$F'(x) = 32x + 8$

formula

$y = (f(x))^N$

$y' = N(f(x))^{N-1} \cdot f'(x)$

36. Use the product rule to find the derivative of the following (Hint: Write the quantity as a product.)

$$k(t) = (t^2 - 10)^2$$

$$k(t) = (t^2 - 10)(t^2 - 10)$$

formula
$y = f \cdot g$
$y' = f'g + fg'$

$$k'(t) = (t^2 - 10)'(t^2 - 10) + (t^2 - 10)(t^2 - 10)'$$

$$k'(t) = (2t - 0)(t^2 - 10) + (t^2 - 10)(2t - 0)$$

$$k'(t) = (2t)(t^2 - 10) + (t^2 - 10)(2t)$$

$$k'(t) = 2t^3 - 20t + 2t^3 - 20t$$

$$k'(t) = 4t^3 - 40t$$

37 Find the derivative of the function

$$y = \frac{6x-1}{5x+2}$$

formula

$$y = \frac{f}{g}$$

$$y' = \frac{f'g - fg'}{(g)^2}$$

$$y' = \frac{(6x-1)'(5x+2) - (6x-1)(5x+2)'}{(5x+2)^2}$$

$$y' = \frac{(6-0)(5x+2) - (6x-1)(5+0)}{(5x+2)^2}$$

$$y' = \frac{(6)(5x+2) - (6x-1)(5)}{(5x+2)^2}$$

$$y' = \frac{(30x+12) - (30x-5)}{(5x+2)^2}$$

$$y' = \frac{\cancel{30x}+12 - \cancel{30x}+5}{(5x+2)^2}$$

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

38 Use the quotient rule to find the derivative of the function

formula

$$y = \frac{f}{g}$$

$$y' = \frac{f'g - fg'}{(g)^2}$$

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

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

$$y' = \frac{(4x+0)(x-4) - (2x^2+1)(1-0)}{(x-4)^2}$$

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

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

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

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

39. Use the quotient rule to find the derivative of the following

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

formula

$$y = \frac{f}{g}$$

$$y' = \frac{f'g - fg'}{(g)^2}$$

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

$$y' = \frac{(2x - 5 + 0)(x^2 + 5) - (x^2 - 5x + 3)(2x + 0)}{(x^2 + 5)^2}$$

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

$$y' = \frac{(2x^3 + 10x - 5x^2 - 25) - (2x^3 - 10x^2 + 6x)}{(x^2 + 5)^2}$$

$$y' = \frac{(2x^3 - 5x^2 + 10x - 25) - (2x^3 - 10x^2 + 6x)}{(x^2 + 5)^2}$$

$$y' = \frac{\cancel{2x^3} - 5x^2 + 10x - 25 - \cancel{2x^3} + 10x^2 - 6x}{(x^2 + 5)^2}$$

$$y' = \frac{5x^2 + 4x - 25}{(x^2 + 5)^2}$$

40. Find an equation of the line tangent to the graph of $f(x) = (3x-5)(x+4)$ at $(2, 6)$

$x \quad y$

formula

$y = f \cdot g$

$y' = f'g + fg'$

$f(x) = (3x-5)(x+4)$

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

$f'(x) = (3-0)(x+4) + (3x-5)(1+0)$

$f'(x) = (3)(x+4) + (3x-5)(1)$

$f'(x) = 3x + 12 + 3x - 5$

$f'(x) = 6x + 7$

$f'(2) = 6(2)+7$

find $f'(2)$ slope

$f'(2) = 12+7$

$f'(2) = 19 = m$

$m = 19$ at point $(2, 6)$

$x_1 \quad y_1$

$y - y_1 = m(x - x_1)$

$y - (6) = 19(x - (2))$

$y - 6 = 19(x-2)$

$y - 6 = 19x - 38$

$y - \cancel{6} + \cancel{6} = 19x - 38 + 6$

$y = 19x - 32$

41) the total cost (in hundreds of dollars) to produce x units of a product is $C(x) = \frac{6x-7}{3x+1}$. Find the average cost for each of the following production levels.

formula
$y = \frac{f}{g}$,
$y' = \frac{f'g - fg'}{(g)^2}$

(a) 5 units.

$$\bar{C}(x) = \frac{\frac{6x-7}{3x+1}}{x}$$

$$\bar{C}(5) = \frac{\frac{6(5)-7}{3(5)+1}}{5} = \frac{\frac{30-7}{15+1}}{5} = \frac{\frac{23}{16}}{5} = \frac{1.4375}{5} = .2875$$

$$.2875(100) = 28.75$$

since it is in hundreds of dollars

(b) $$\bar{C}(x) = \frac{\frac{6x-7}{3x+1}}{\frac{x}{1}} = \frac{6x-7}{3x+1} \cdot \frac{1}{x} = \frac{6x-7}{3x^2+x}$$

(c) find marginal average cost function

$$\bar{C}(x) = \frac{6x-7}{3x^2+x}$$

$$\bar{C}'(x) = \frac{(6x-7)'(3x^2+x) - (6x-7)(3x^2+x)'}{(3x^2+x)^2}$$

$$\bar{C}'(x) = \frac{(6-0)(3x^2+x) - (6x-7)(6x+1)}{(3x^2+x)^2}$$

$$\bar{C}'(x) = \frac{(6)(3x^2+x) - (6x-7)(6x+1)}{(3x^2+x)^2}$$

$$\bar{C}'(x) = \frac{(18x^2+6x) - (36x^2+6x-42x-7)}{(3x^2+x)^2}$$

$$\bar{C}'(x) = \frac{(18x^2+6x) - (3x^2-36x-7)}{(3x^2+x)^2}$$

$$\bar{C}'(x) = \frac{18x^2+6x-36x^2+36x+7}{(3x^2+x)^2}$$

$$\bar{C}'(x) = \frac{-18x^2+42x+7}{(3x^2+x)^2}$$

43

$y=(6x^4-8x^2+8)^4$

Chain formula

$y=(f(x))^N$

$y'=N(f(x))^{N-1}\cdot f'(x)$

$y'=4(6x^4-8x^2+8)^{4-1}\cdot(6x^4-8x^2+8)'$

$y'=4(6x^4-8x^2+8)^3(24x^3-16x+0)$

$y'=4(6x^4-8x^2+8)^3(24x^3-16x)$

44

$y = (9x^4 - 6x^2 + 7)^4$

$y' = \frac{dy}{dx} = 4(9x^4 - 6x^2 + 7)^{4-1} \cdot (9x^4 - 6x^2 + 7)'$

$y' = 4(9x^4 - 6x^2 + 7)^3 (36x^3 - 12x + 0)$

$y' = 4(9x^4 - 6x^2 + 7)^3 (36x^3 - 12x)$

Chain formula

$y = (f(x))^N$

$y' = N(f(x))^{N-1} \cdot f'(x)$

45.

$$y = -7(6x^2+8)^{-6}$$

$$\frac{dy}{dx} = y' = -7(-6)(6x^2+8)^{-6-1} \cdot (6x^2+8)'$$

$$y' = 42(6x^2+8)^{-7} \cdot (12x+0)$$

$$y' = 42(6x^2+8)^{-7} \cdot (12x)$$

$$y' = 504x(6x^2+8)^{-7}$$

formula chain

$$y = (f(x))^N$$

$$y' = N(f(x))^{N-1} \cdot (f'(x))$$

(46) $s(t) = 41(4t^3-3)^{6/5}$

$$s'(t) = \frac{6}{5}(41)(4t^3-3)^{\frac{6}{5}-1}(4t^3-3)'$$

$$s'(t) = \frac{6}{5}(41)(4t^3-3)^{\frac{6}{5}-\frac{5}{5}}(12t^2-0)$$

$$s'(t) = \frac{6}{5}(41)(4t^3-3)^{\frac{6-5}{5}}(12t^2)$$

$$s'(t) = \frac{6}{5}(41)(4t^3-3)^{\frac{1}{5}}(12t^2)$$

$$s'(t) = \frac{6}{5}\left(\frac{41}{1}\right)\left(\frac{12t^2}{1}\right)(4t^3-3)^{1/5}$$

$$s'(t) = \frac{2952t^2(4t^3-3)^{1/5}}{5}$$

Chain Formula

$$y = (f(x))^N$$

$$y' = N(f(x))^{N-1} \cdot f'(x)$$

47.

$f(x) = 8\sqrt{9x^2+3}$

$f(x) = 8(9x^2+3)^{1/2}$

$f'(x) = 8\left(\frac{1}{2}\right)(9x^2+3)^{1/2-1} \cdot (9x^2+3)'$

$f'(x) = 8\left(\frac{1}{2}\right)(9x^2+3)^{\frac{1}{2}-\frac{2}{2}}(18x+0)$

$f'(x) = \frac{8}{1}\left(\frac{1}{2}\right)(9x^2+3)^{\frac{1-2}{2}}(18x)$

$f'(x) = \frac{8}{2}(9x^2+3)^{-1/2}(18x)$

$f'(x) = 4(9x^2+3)^{-1/2}(18x)$

$f'(x) = 4(18x)(9x^2+3)^{-1/2}$

$f'(x) = 72x(9x^2+3)^{-1/2}$

$f'(x) = \frac{72x}{(9x^2+3)^{1/2}}$

$f'(x) = \frac{72x}{\sqrt{9x^2+3}}$

formula

$y = (f(x))^N$

$y' = N(f(x))^{N-1}(f'(x))$

(48) $m(t) = -6t(5t^4-1)^4$

$m'(t) = (-6t)'(5t^4-1)^4 + (-6t)((5t^4-1)^4)'$

$m'(t) = (-6)(5t^4-1)^4 + (-6t)(4(5t^4-1)^{4-1} \cdot (5t^4-1)')$

$m'(t) = (-6)(5t^4-1)^4 + (-6t)(4(5t^4-1)^3 \cdot (20t^3-0))$

$m'(t) = (-6)(5t^4-1)^4 + (-6t)(4(5t^4-1)^3 \cdot (20t^3))$

$m'(t) = (-6)(5t^4-1)^4 - 480t^4(5t^4-1)^3$

$m'(t) = (-6)(5t^4-1)^3\left[(5t^4-1)^1 + 80t^4\right]$

$m'(t) = -6(5t^4-1)^3\left[5t^4 - 1 + 80t^4\right]$

$m'(t) = -6(5t^4-1)^3\left[85t^4 - 1\right]$

formula

$y = f \cdot g$

$y' = f'g + fg'$

chain

$y = (f(x))^N$

$y' = N(f(x))^{N-1} \cdot f'(x)$

53 $y = e^{-8x}$

$y' = e^{-8x}(-8x)'$

$y' = e^{-8x}(-8)$

$y' = -8e^{-8x}$

Formula

$y = e^{f(x)}$

$y' = e^{f(x)} \cdot f'(x)$

54.

$f(x) = -5e^{-2x}$

$f'(x) = -5e^{-2x}(-2x)'$

$f'(x) = -5e^{-2x}(-2)$

$f'(x) = 10e^{-2x}$

formula

$y = e^{f(x)}$

$y' = e^{f(x)} \cdot f'(x)$

55

$$y = e^{x^4}$$

$$y' = (e^{x^4})(x^4)'$$

$$y' = e^{x^4}(4x^3)$$

$$y' = 4x^3 e^{x^4}$$

formula

$$y = e^{f(x)}$$

$$y' = e^{f(x)} \cdot f'(x)$$

56

$y = 5e^{3x^2}$

$y' = 5e^{3x^2}(3x^2)'$

$y' = 5e^{3x^2}(6x)$

$y' = 30xe^{3x^2}$

formula

$y = e^{f(x)}$

$y' = e^{f(x)} \cdot f'(x)$

57)

$y = x^9 e^x$

formula
$y = f \cdot g$
$y' = f'g + fg'$

$y' = (x^9)'(e^x) + (x^9)(e^x)'$

$y' = (9x^8)(e^x) + (x^9)(e^x(x)')$

$y' = (9x^8)(e^x) + (x^9)(e^x(1))$

$y' = (9x^8)(e^x) + (x^9)(e^x)$

$y' = 9x^8e^x + x^9e^x$

58

$$y=(12x^2-24x+24)e^{-3x}$$

$$y'=(12x^2-24x+24)'(e^{-3x})+(12x^2-24x+24)(e^{-3x})'$$

$$y'=(24x-24+0)e^{-3x}+((12x^2-24x+24)(e^{-3x}(-3x)'))$$

$$y'=(24x-24)e^{-3x}+(12x^2-24x+24)(e^{-3x}(-3))$$

$$y'=(24x-24)e^{-3x}-3(12x^2-24x+24)e^{-3x}$$

$$y'=e^{-3x}\left((24x-24)-3(12x^2-24x+24)\right)$$

$$y'=e^{-3x}(24x-24-36x^2+72x-72)$$

$$y'=e^{-3x}(-36x^2+96x-96)$$

$$y'=12e^{-3x}(-3x^2+8x-8)$$

Formula

$$y=f\cdot g$$

$$y'=f'g+fg'$$

59 $y = \dfrac{-8e^{2x}}{5x-2}$

$$y' = \frac{(-8e^{2x})'(5x-2) - (-8e^{2x})(5x-2)'}{(5x-2)^2}$$

$$y' = \frac{(-8e^{2x}(2x)')(5x-2) - (-8e^{2x})(5-0)}{(5x-2)^2}$$

$$y' = \frac{((-8e^{2x})(2))(5x-2) - (-8e^{2x})(5))}{(5x-2)^2}$$

$$y' = \frac{-16e^{2x}(5x-2) + 40e^{2x}}{(5x-2)^2}$$

$$y' = \frac{8e^{2x}(-2(5x-2) + 5)}{(5x-2)^2}$$

$$y' = \frac{8e^{2x}(-10x+4+5)}{(5x-2)^2}$$

$$y' = \frac{8e^{2x}(-10x+9)}{(5x-2)^2}$$

formula

$y = \dfrac{f}{g}$

$y' = \dfrac{f'g - fg'}{(g)^2}$

(60) $y = \dfrac{e^{3x}+e^{-3x}}{x}$

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

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

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

$$y' = (3e^{3x}+3e^{-3x})(1(x)-1)$$

$$y' = (3e^{3x}+3e^{-3x})(x-1)$$

Formula

$$y = \frac{f}{g}$$

$$y' = \frac{f'g-fg'}{(g)^2}$$

61. $y = \dfrac{200}{41+2e^{-2x}}$

$$y' = \frac{(200)'(41+2e^{-2x}) - (200)(41+2e^{-2x})'}{(41+2e^{-2x})^2}$$

$$y' = \frac{(0)(41+2e^{-2x}) - (200)(0+2e^{-2x}(-2))}{(41+2e^{-2x})^2}$$

$$y' = \frac{0 - 200(-4e^{-2x})}{(41+2e^{-2x})^2}$$

$$y' = \frac{800e^{-2x}}{(41+2e^{-2x})^2}$$

formula

$$y = \frac{f}{g}$$

$$y' = \frac{f'g - fg'}{(g)^2}$$

62.

$y = 7^{8x+1}$

$y' = \ln(7)\left(7^{8x+1}\right)(8x+1)'$

$y' = \ln(7)\left(7^{8x+1}\right)(8)$

$y' = 8\ln(7)\left(7^{8x+1}\right)$

Formula

$y = a^{f(x)}$

$y' = \ln(a) \cdot a^{f(x)} \cdot f'(x)$

63.

$$y = 9 \cdot 2^{\sqrt{x-2}}$$

formula

$$y = a^{f(x)}$$

$$y' = \ln(a)\left(a^{f(x)}\right)\left(f'(x)\right)$$

$$y' = 9\left(\ln(2)\left(2^{\sqrt{x-2}}\right)\cdot\left(\sqrt{x-2}\right)'\right)$$

$$y' = 9\left(\ln(2)\left(2^{\sqrt{x-2}}\right)\right)\left(\left(x-2\right)^{\frac{1}{2}}\right)'$$

$$y' = 9\left(\ln(2)\left(2^{\sqrt{x-2}}\right)\right)\left(\tfrac{1}{2}(x-2)^{\frac{1}{2}-1}\cdot(x-2)'\right)$$

$$y' = 9\left(\ln(2)\left(2^{\sqrt{x-2}}\right)\right)\left(\tfrac{1}{2}(x-2)^{\frac{1}{2}-\frac{2}{2}}(1-0)\right)$$

$$y' = 9\left(\ln(2)\left(2^{\sqrt{x-2}}\right)\right)\left(\tfrac{1}{2}(x-2)^{-\frac{1}{2}}(1)\right)$$

$$y' = 9\left(\ln(2)\left(2^{\sqrt{x-2}}\right)\right)\left(\tfrac{1}{2}(x-2)^{-\frac{1}{2}}\right)$$

$$y' = 9\left(\ln(2)\left(2^{\sqrt{x-2}}\right)\right)\left(\frac{1}{2(x-2)^{\frac{1}{2}}}\right)$$

$$y' = 9\left(\ln(2)\left(2^{\sqrt{x-2}}\right)\right)\left(\frac{1}{2\sqrt{x-2}}\right)$$

64

formula
$$y = e^{f(x)}$$
$$y' = e^{f(x)} \cdot f'(x)$$

$$y = e^{x\sqrt{9x+4}}$$

$$y' = e^{x\sqrt{9x+4}} \cdot \left(x\sqrt{9x+4}\right)'$$

$$y' = e^{x\sqrt{9x+4}}\left((x)'\left(\sqrt{9x+4}\right) + (x)\left(\sqrt{9x+4}\right)'\right)$$

$$y' = e^{x\sqrt{9x+4}}\left((1)\left(\sqrt{9x+4}\right) + (x)\left(\left(9x+4\right)^{\frac{1}{2}}\right)'\right)$$

$$y' = e^{x\sqrt{9x+4}}\left((1)\left(\sqrt{9x+4}\right) + (x)\left(\tfrac{1}{2}(9x+4)^{\frac{1}{2}-1}(9x+4)'\right)\right)$$

$$y' = e^{x\sqrt{9x+4}}\left((1)\left(\sqrt{9x+4}\right) + (x)\left(\tfrac{1}{2}(9x+4)^{\frac{1}{2}-\frac{2}{2}}\right)(9+0)\right)$$

$$y' = e^{x\sqrt{9x+4}}\left((1)\left(\sqrt{9x+4}\right) + (x)\left(\tfrac{1}{2}(9x+4)^{-\frac{1}{2}}(9)\right)\right)$$

$$y' = e^{x\sqrt{9x+4}}\left((1)\left(\sqrt{9x+4}\right) + (x)\left(\tfrac{1}{2}(9x+4)^{-\frac{1}{2}}\right)\right)$$

$$y' = e^{x\sqrt{9x+4}}\left(\sqrt{9x+4} + \tfrac{9}{2}x(9x+4)^{-\frac{1}{2}}\right)$$

$$y' = e^{x\sqrt{9x+4}}\left(\sqrt{9x+4} + \frac{9x}{2\sqrt{9x+4}}\right)$$

$$y' = e^{x\sqrt{9x+4}}\left(\frac{\sqrt{9x+4}}{1}\cdot\frac{2\sqrt{9x+4}}{2\sqrt{9x+4}} + \frac{9x}{2\sqrt{9x+4}}\right)$$

$$y' = e^{x\sqrt{9x+4}}\left(\frac{2\left(\sqrt{9x+4}\right)^2}{2\sqrt{9x+4}} + \frac{9x}{2\sqrt{9x+4}}\right)$$

$$y' = e^{x\sqrt{9x+4}}\left(\frac{2(9x+4) + 9x}{2\sqrt{9x+4}}\right) =$$

$$y' = e^{x\sqrt{9x+4}}\left(\frac{18x+8+9x}{2\sqrt{9x+4}}\right) =$$

$$y' = e^{x\sqrt{9x+4}}\left(\frac{27x+8}{2\sqrt{9x+4}}\right)$$

65

$S(t) = 98 - 90e^{-0.4t}$

$S'(t) = 0 - 90e^{-0.4t}(-0.4t)'$

$S'(t) = 0 - 90e^{-0.4t}(-0.4)$

$S'(t) = 0 + 36e^{-0.4t}$

$S'(t) = 36e^{-0.4t}$

$S'(1) = 36e^{-0.4(1)}$

$S'(1) = 24.13152166$

$S'(5) = 36e^{-0.4(5)}$

$S'(5) = 4.872070097$

formula

$y = e^{f(x)}$

$y' = e^{f(x)} \cdot f'(x)$

It ~~is~~ always decreases

Does the rate of change of sales ever equal zero?

NO

66 $y = \ln(9-4x)$

$$y' = \frac{(9-4x)'}{9-4x}$$

$$y' = \frac{(0-4)}{9-4x}$$

$$y' = \frac{-4}{9-4x}$$

Formula

$$y = \ln(f(x))$$

$$y' = \frac{f'(x)}{f(x)}$$

67

$$y = \ln(7x^2 - 5x)$$

$$y' = \frac{(7x^2 - 5x)'}{7x^2 - 5x}$$

$$y' = \frac{(14x - 5)}{7x^2 - 5x}$$

$$y' = \frac{14x - 5}{7x^2 - 5x}$$

formula

$$y = \ln f(x)$$

$$y' = \frac{f'(x)}{f(x)}$$

68.

$$y = \ln\sqrt{x+6}$$

$$y = \ln(x+6)^{1/2}$$

$$y = \frac{1}{2}\ln(x+6)$$

$$y' = \frac{1}{2}\frac{(x+6)'}{(x+6)}$$

$$y' = \frac{1}{2}\frac{(1+0)}{(x+6)}$$

$$y' = \frac{1}{2}\frac{(1)}{(x+6)}$$

$$y' = \frac{1}{2(x+6)}$$

formula

$$y = \ln(f(x))$$

$$y' = \frac{f'(x)}{f(x)}$$

69.

$$y = \ln(9x^7+5x)^{9/7}$$

$$y = \frac{9}{7}\ln(9x^7+5x)$$

$$y' = \frac{9}{7}\,\frac{(9x^7+5x)'}{(9x^7+5x)}$$

$$y' = \frac{9}{7}\,\frac{(63x^6+5)}{(9x^7+5x)}$$

$$y' = \frac{9(63x^6+5)}{7x(9x^6+5)}$$

Formula

$$y = \ln(f(x))$$

$$y' = \frac{f'(x)}{f(x)}$$

70.

$$y = -8x \ln(3x+1)$$

$$y' = (-8x)'(\ln(3x+1)) + (-8x)(\ln(3x+1))'$$

$$y' = (-8)(\ln(3x+1)) + (-8x)\left(\frac{(3x+1)'}{(3x+1)}\right)$$

$$y' = -8\ln(3x+1) - 8x\left(\frac{3+0}{3x+1}\right)$$

$$y' = -8\ln(3x+1) - 8x\left(\frac{3}{3x+1}\right)$$

$$y' = -8\ln(3x+1) - \frac{24x}{3x+1}$$

$$y' = -\frac{24x}{3x+1} - 8\ln(3x+1)$$

formula

$$y = f \cdot g$$

$$y' = f'g + fg'$$

71. $s = t^{14}\ln(t)$

$s' = (t^{14})'(\ln(t)) + (t^{14})(\ln(t))'$

$s' = (14t^{13})(\ln(t)) + (t^{14})\left(\frac{t'}{t}\right)$

$s' = (14t^{13})(\ln(t)) + (t^{14})\left(\frac{1}{t}\right)$

$s' = 14t^{3}\ln(t) + \frac{t^{14}}{t^{1}}$

$s' = 14t^{3}\ln(t) + t^{13}$

$s' = t^{13} + 14t^{3}\ln(t)$

formula

$y = fg$

$y' = f'g + fg'$

72 $y = \dfrac{6\ln(x+9)}{x^2}$

formula $y = \dfrac{f}{g}$ $y' = \dfrac{f'g - fg'}{(g)^2}$

$$y' = \frac{(6\ln(x+9))'(x^2) - (6\ln(x+9))(x^2)'}{(x^2)^2}$$

$$y' = \frac{\left(6\,\frac{(x+9)'}{x+9}\right)(x^2) - (6\ln(x+9))(2x)}{x^4}$$

$$y' = \frac{\left(6\,\frac{(1+0)}{x+9}(x^2)\right) - (6\ln(x+9))(2x)}{x^4}$$

$$y' = \frac{\left(6\,\frac{(1)}{x+9}(x^2)\right) - (6\ln(x+9)(2x)}{x^4}$$

$$y' = \frac{\frac{6x^2}{x+9} - \frac{6\ln(x+9)(2x)}{1}}{x^4}$$

$$y' = \frac{\frac{6x^2}{x+9} - \frac{12x\ln(x+9)}{1}}{x^4} \quad \frac{\frac{(x+9)}{1}}{\frac{(x+9)}{1}}$$

$$y' = \frac{\frac{6x^2\cancel{(x+9)}}{\cancel{(x+9)}} - \frac{12x\ln(x+9)(x+9)}{1}}{x^4(x+9)}$$

$$y' = \frac{6x^2 - 12x\ln(x+9)(x+9)}{x^4(x+9)}$$

$$y' = \frac{\cancel{x}(6x - 12(x+9)\ln(x+9))}{x^4(x+9)}$$

$$y' = \frac{6x - 12(x+9)\ln(x+9)}{x^3(x+9)}$$

1/10

$\int (18x+8)\,dx =$

$\frac{18x^{1+1}}{1+1} + 8x + C =$

$\frac{18x^2}{2} + 8x + C =$

$9x^2 + 8x + C =$

Formula

$\int x^n\,dx$

$\frac{x^{n+1}}{n+1} + C$

$\int a\,dx$

$ax + C$

111.

$$\int(9x^2-9x+4)\,dx =$$

$$\frac{9x^{2+1}}{2+1} - \frac{9x^{1+1}}{1+1} + 4x + C =$$

$$\frac{9x^3}{3} - \frac{9x^2}{2} + 4x + C =$$

$$3x^3 - \frac{9}{2}x^2 + 4x + C =$$

formula

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

$$\int a\,dx = ax + C$$

11c

$\int (11\sqrt{x} + \sqrt{2})\,dx =$

$\int (11x^{1/2} + \sqrt{2})\,dx =$

$\dfrac{11x^{1/2+1}}{\frac{1}{2}+1} + \sqrt{2}x + C =$

$\dfrac{11x^{\frac{1}{2}+\frac{2}{2}}}{\frac{1}{2}+\frac{2}{2}} + \sqrt{2}x + C =$

$\dfrac{11x^{3/2}}{3/2} + \sqrt{2}x + C =$

$\frac{2}{3}(11x^{3/2}) + \sqrt{2}x + C =$

$\dfrac{22x^{3/2}}{3} + \sqrt{2}x + C =$

formula

$\int x^n\,dx =$

$\dfrac{x^{n+1}}{n+1} + C =$

$\int a\,dx =$

$ax + C =$

113

$$\int 3x^2(x^4+8)\,dx =$$

$$\int 3x^6 + 24x^2\,dx =$$

$$\frac{3x^{6+1}}{6+1} + \frac{24x^{2+1}}{2+1} + C =$$

$$\frac{3x^7}{7} + \frac{24x^3}{3} + C =$$

$$\frac{3x^7}{7} + 8x^3 + C =$$

formula

$$\int x^n\,dx =$$

$$\frac{x^{n+1}}{n+1} + C =$$

$$\int a\,dx =$$

$$ax + C =$$

114. $\int (12\sqrt[5]{x} - 14x^{4/7})\,dx =$

formula

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C$$

$$\int (12x^{1/5} - 14x^{4/7})\,dx =$$

$$\frac{12x^{1/5+1}}{\frac{1}{5}+1} - \frac{14x^{4/7+1}}{\frac{4}{7}+1} + C =$$

$$\frac{12x^{\frac{1}{5}+\frac{5}{5}}}{\frac{1}{5}+\frac{5}{5}} - \frac{14x^{\frac{4}{7}+\frac{7}{7}}}{\frac{4}{7}+\frac{7}{7}} + C =$$

$$\frac{12x^{\frac{6}{5}}}{\frac{6}{5}} - \frac{14x^{\frac{11}{7}}}{\frac{11}{7}} + C =$$

$$\frac{5}{6}\cdot(12x^{6/5}) - \frac{7}{11}(14x^{\frac{11}{7}}) + C =$$

$$\frac{60}{6}x^{6/5} - \frac{88}{11}x^{\frac{11}{7}} + C =$$

$$10x^{6/5} - \frac{88}{11}x^{\frac{11}{7}} + C =$$

115

$$\int \frac{5}{x^3}dx =$$

$$\int 5x^{-3}dx =$$

$$\frac{5x^{-3+1}}{-3+1} + C =$$

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

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

$$-\frac{5}{2x^2} + C$$

formula

$$\int x^n dx =$$

$$\frac{x^{n+1}}{n+1} + C =$$

116. $\int \left(\frac{e}{x^6} + \frac{\pi}{\sqrt{x}}\right) dx$

Formula

$\int x^n dx = \frac{x^{n+1}}{n+1} + C =$

$\int \left(\frac{e}{x^6} + \frac{\pi}{x^{1/2}}\right) dx$

$\int \left(e(x^6) + \pi x^{-1/2}\right) dx$

$\frac{e \cdot x^{6+1}}{6+1} + \frac{\pi x^{-1/2+1}}{-1/2+1} + C =$

$\frac{e \cdot x^7}{7} + \frac{\pi x^{-1/2 + 2/2}}{-1/2 + 2/2} + C =$

$\frac{e \cdot x^7}{7} + \frac{\pi x^{1/2}}{1/2} + C =$

$\frac{e \cdot x^7}{7} + \frac{\pi \sqrt{x}}{1/2} + C =$

$\frac{e \cdot x^7}{7} + \frac{2}{1} \pi \sqrt{x} + C =$

$\frac{e \cdot x^7}{7} + 2\pi\sqrt{x} + C =$

(117) $\int \frac{1}{2x^7}dx =$

$\int \frac{1x^{-7}}{2}dx =$

$\frac{\frac{1}{2}x^{-7+1}}{-7+1} + C =$

$\frac{\frac{1}{2}x^{-6}}{-6} + c =$

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

$\frac{-1}{12}x^{-6} + C =$

$\frac{-1}{12x^6} + C$

formula

$\int x^n dx$

$\frac{x^{n+1}}{n+1} + C$

118. $\int 5e^{-0.4x}\,dx =$

$5\int e^{-0.4x}\,dx =$

$5\left(\frac{1}{-0.4}\right)\int e^{-0.4x}(-0.4)\,dx =$

$\frac{5}{-0.4}e^{-0.4x}+C =$

$-12.5e^{-0.4x}+C =$

formula

$\int e^{f(x)} \cdot f'(x)\,dx =$

$e^{f(x)}+C =$

119. $$\int \left(\frac{3}{x} - 8e^{3x} + e^{0.6x}\right) dx$$

$$\int \frac{3}{x}\,dx + \int -8e^{3x}\,dx + \int e^{0.6x}\,dx =$$

$$3\int \frac{1}{x}\,dx - 8\int e^{3x}\,dx + \int e^{0.6}\,dx =$$

$$3\int \frac{1}{x}\,dx - 8\left(\frac{1}{3}\right)\int e^{3x}(3)\,dx + \int e^{0.6}\,dx =$$

$$3\ln(x) - \frac{8}{3}e^{3x} + e^{0.6}x + C =$$

formula

$$\int \frac{f'(x)}{f(x)}\,dx =$$
$$\ln(f(x)) + C$$

$$\int e^{f(x)} \cdot f'(x)\,dx =$$
$$e^{f(x)} + C$$

120.

$$\int \frac{1+10t^3}{7t}\,dt =$$

$$\int \frac{1}{7t} + \frac{10t^3}{7t}\,dt =$$

$$\int \frac{1}{7t} + \frac{10}{7}t^2\,dt =$$

$$\int \frac{1}{7t}\,dt + \int \frac{10}{7}t^2\,dt =$$

$$\frac{1}{7}\int \frac{1}{t}\,dt + \frac{10}{7}\int t^2\,dt =$$

$$\frac{1}{7}\ln(t) + \frac{10}{7}\frac{t^{2+1}}{2+1} + C =$$

$$\frac{1}{7}\ln(t) + \frac{10}{7}\frac{t^3}{3} + C =$$

$$\frac{1}{7}\ln(t) + \frac{10}{21}t^3 + C =$$

~~formula~~

$$\int \frac{f'(x)}{f(x)}\,dx = \ln(f(x)) + C =$$

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + C =$$