TUGAS KALKULUS 3

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1. $y = \frac{x^2-5x+6}{x^2-3x+2}$ $u = x^2-5x+6$ $u' = 2x-5$; $v = x^2-3x+2$ $v' = 2x-3$

$$y' = \frac{u'v - uv'}{v^2} = \frac{(2x-5)(x^2-3x+2) - (x^2-5x+6)(2x-3)}{(x^2-3x+2)}$$

$$= \frac{(2x^3 - 6x^2 + 4x - 5x^2 + 15x - 10) - 2x^3 + 3x^2 + 10x^2 - 15x - 12x + 18}{((x-2)(x-1))^2}$$

$$= \frac{2x^2 - 8x + 8}{(x-2)^2(x-1)^2} = \frac{2(x^2-4x+4)}{(x-2)^2(x-1)^2} = \frac{2(x-2)^2}{(x-2)^2(x-1)^2} = \frac{2}{x^2-2x+1}$$

2. $y = (6x^2-2x+7)(2x^3-x^2+7x)^5$ $u = 6x^2-2x+7$ $u' = 12x-2$; $v = (2x^3-x^2+7x)^5$ $v' = 5(2x^3-x^2+7x)^4(6x^2-2x+7)$

$y' = u'v + uv'$

$= (12x-2)(2x^3-x^2+7x)^5 + (6x^2-2x+7)5(2x^3-x^2+7x)^4(6x^2-2x+7)$

$= (12x-2)(2x^3-x^2+7x)^5 + 5(6x^2-2x+7)^2(2x^3-x^2+7x)^4$

3. $y = \ln\left(\frac{3x+2}{11x+7}\right)$ $u = 3x+2$ $u' = 3$; $v = 11x+7$ $v' = 11$

misal $= \ln x$

$$\rightarrow x' = \frac{u'v - uv'}{v^2} = \frac{3\cdot(11x+7) - (3x+2)(11)}{(11x+7)^2} = \frac{33x + 21 - 33x - 22}{(11x+7)^2}$$

$$= \frac{-1}{(11x+7)^2} \leftarrow$$

$y' = \frac{1}{x}\cdot x'$

$$= \frac{11x+7}{3x+2}\cdot\frac{-1}{(11x+7)^2} = \frac{-1}{(3x+2)(11x+7)} = \frac{-1}{33x^2+43x+14}$$

4. $y = 3x\cdot e^{x^2+1}$ $u = 3x$ $u' = 3$; $v = e^{x^2+1}$ $v' = 2x\cdot e^{(x^2+1)}$

$y' = u'v + uv'$

$= 3\cdot e^{x^2+1} + 3x\cdot 2x\cdot e^{(x^2+1)}$

$= 3e^{x^2+1} + 6x^2e^{x^2+1}$

5. $y = x^{x^x}$ $\rightarrow$ $u = x^x$ $\Rightarrow u'$: $w = x$ $w' = 1$, $z = x$ $z' = 1$ $= x^x\left[1\cdot\frac{x}{x} + 1\cdot\ln x\right] = x^x[1+\ln x]$

$v = x$ $\Rightarrow v' = 1$

$$y' = x^{x^x}\left[x^x[1+\ln x]\cdot\frac{x}{x^x} + 1\cdot\ln x^x\right]$$

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6. $y = 11 \sin(9^{7x-3})$

↳ $x' = 7 \cdot 9^{7x-3} \cdot \ln 9$

$= 11 \cdot 7 \cdot 9^{7x-3} \cdot \ln 9 \cos(9^{7x-3})$

$= 77 \cdot 9^{7x-3} \cdot \ln 9 \cdot \cos(9^{7x-3})$