TURUNAN 1

Wardah K. (04211040)

contoh handwriting turunan 1

① $y = (3x^4 + 2x^2 + x)(x^2 + 7)$

$y' = (12x^3 + 4x + 1)(x^2 + 7) + (3x^4 + 2x^2 + x)(2x)$

$\therefore 12x^3 + 4x + 1$ | $\therefore 3x^4 + 2x^2 + x$

$x^2 + 7$ | $2x$

$12x^5 + 4x^3 + x^2$ | $6x^5 + 4x^3 + 2x^2$

$84x^3 + 28x + 7$

$12x^5 + 88x^3 + x^2 + 28x + 7$

$\therefore 12x^5 + 88x^3 + x^2 + 28x + 7$

$6x^5 + 4x^3 + 2x^2$ +

$18x^5 + 92x^3 + 3x^2 + 28x + 7$

$y' = 18x^5 + 92x^3 + 3x^2 + 28x + 7$ //

② $y = (x^3 + 3x^2)(4x^2 + 2)$

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

$\therefore 3x^2 + 6x$ | $\therefore x^3 + 3x^2$

$4x^2 + 2$ | $8x$

$12x^4 + 24x^3$ | $8x^4 + 24x^3$

$6x^2 + 12x$

$12x^4 + 24x^3 + 6x^2 + 12x$

$8x^4 + 24x^3$ +

$20x^4 + 48x^3 + 6x^2 + 12x$

$y' = 20x^4 + 48x^3 + 6x^2 + 12x$ //

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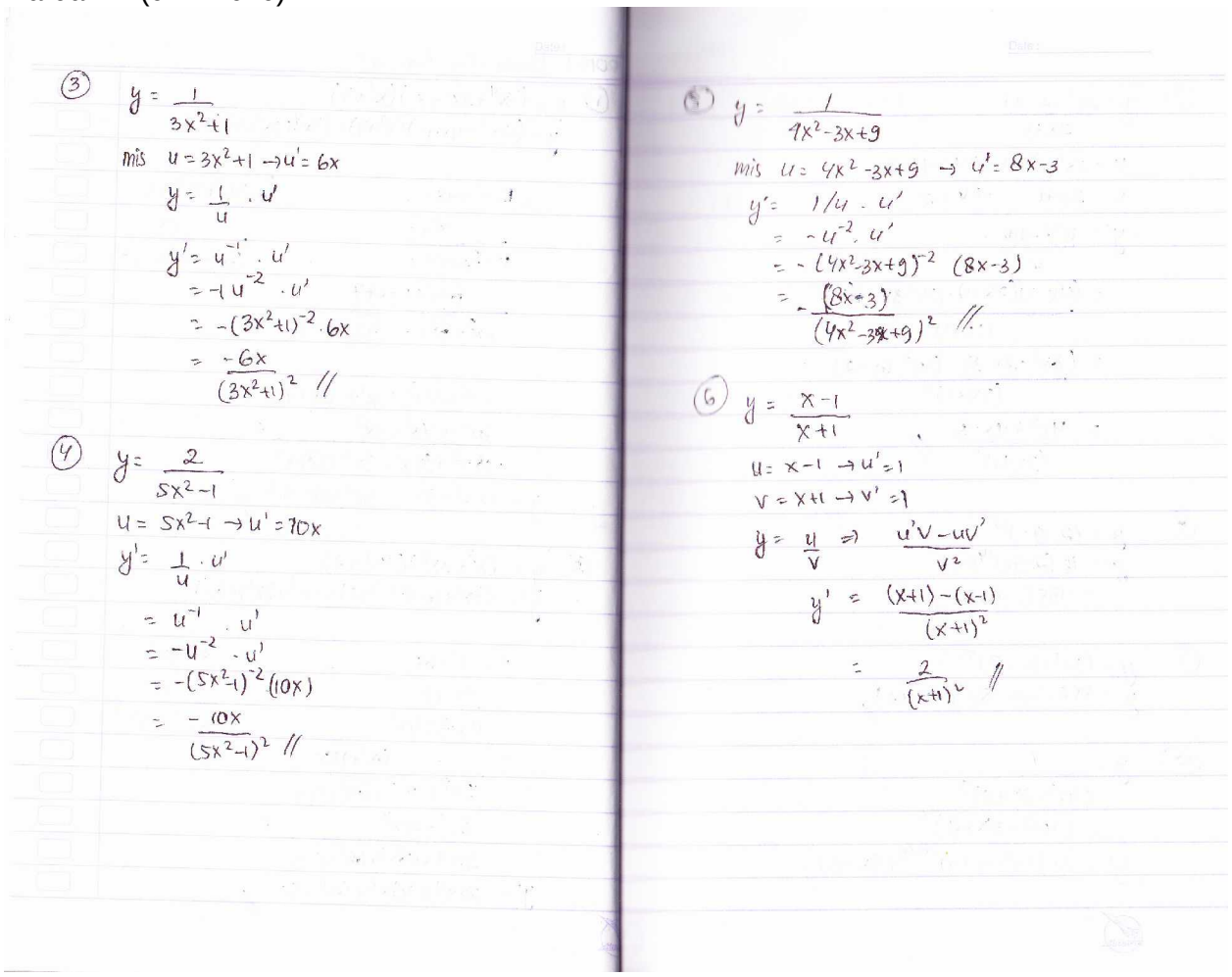

③ $y = \frac{1}{3x^2+1}$

misi $u = 3x^2+1 \rightarrow u' = 6x$

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

$y' = u^{-1} \cdot u'$

$= -1\, u^{-2} \cdot u'$

$= -(3x^2+1)^{-2} \cdot 6x$

$= \frac{-6x}{(3x^2+1)^2}$ //

④ $y = \frac{2}{5x^2-1}$

$u = 5x^2-1 \rightarrow u' = 10x$

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

$= u^{-1} \cdot u'$

$= -u^{-2} \cdot u'$

$= -(5x^2-1)^{-2}(10x)$

$= \frac{-10x}{(5x^2-1)^2}$ //

⑤ $y = \frac{1}{4x^2-3x+9}$

misi $u = 4x^2-3x+9 \rightarrow u' = 8x-3$

$y' = 1/u \cdot u'$

$= -u^{-2} \cdot u'$

$= -(4x^2-3x+9)^{-2}(8x-3)$

$= -\frac{(8x-3)}{(4x^2-3x+9)^2}$ //

⑥ $y = \frac{x-1}{x+1}$

$u = x-1 \rightarrow u' = 1$

$v = x+1 \rightarrow v' = 1$

$y = \frac{u}{v} \Rightarrow \frac{u'v - uv'}{v^2}$

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

$= \frac{2}{(x+1)^2}$ //

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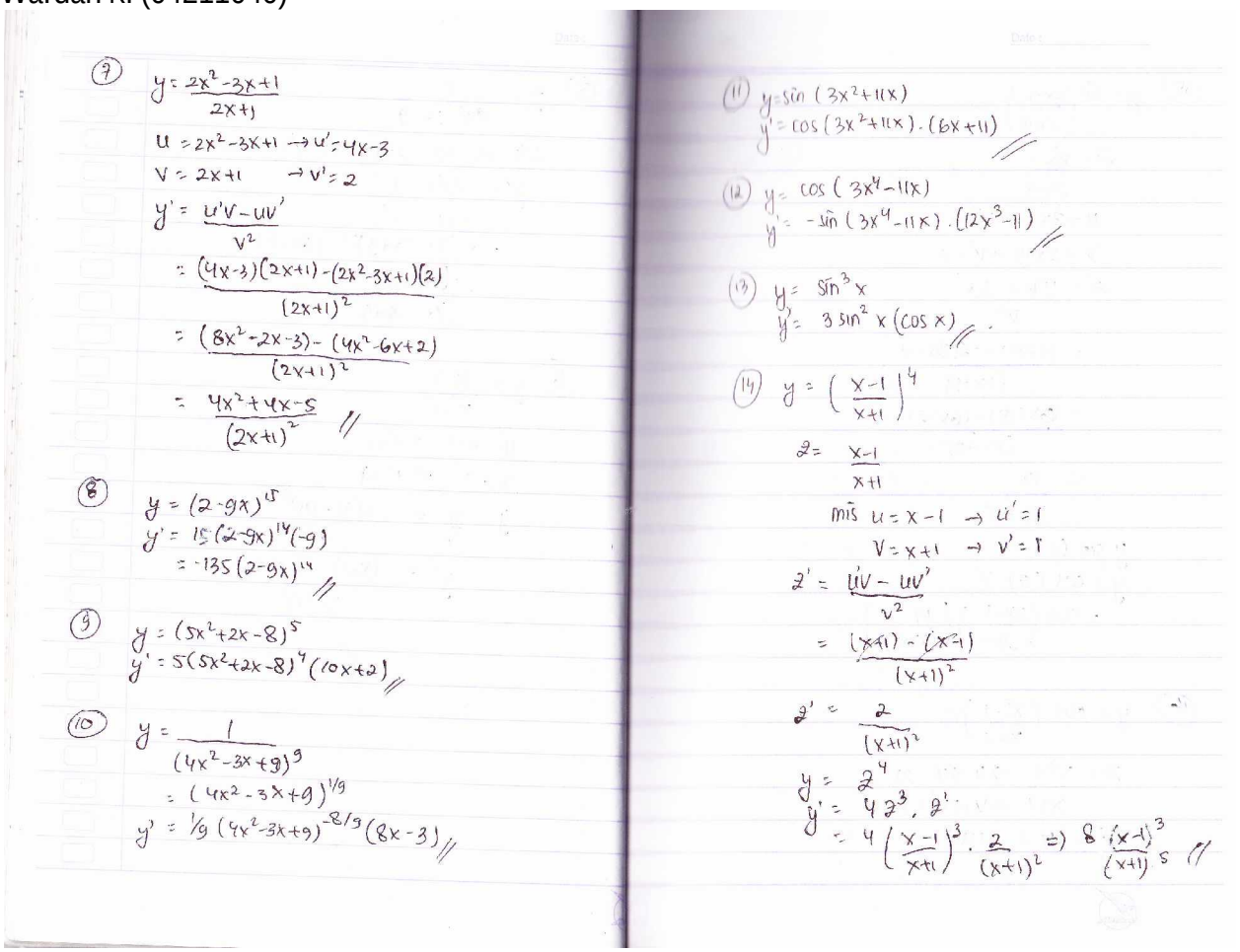

(7) $y = \frac{2x^2-3x+1}{2x+1}$

$u = 2x^2-3x+1 \rightarrow u' = 4x-3$

$v = 2x+1 \rightarrow v' = 2$

$y' = \frac{u'v-uv'}{v^2}$

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

$= \frac{(8x^2-2x-3)-(4x^2-6x+2)}{(2x+1)^2}$

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

(8) $y = (2-9x)^{15}$

$y' = 15(2-9x)^{14}(-9)$

$= -135(2-9x)^{14}$ //

(9) $y = (5x^2+2x-8)^5$

$y' = 5(5x^2+2x-8)^4(10x+2)$ //

(10) $y = \frac{1}{(4x^2-3x+9)^9}$

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

$y' = 1/9\,(4x^2-3x+9)^{-8/9}(8x-3)$ //

(11) $y = \sin(3x^2+11x)$

$y' = \cos(3x^2+11x)\cdot(6x+11)$ //

(12) $y = \cos(3x^4-11x)$

$y' = -\sin(3x^4-11x)\cdot(12x^3-11)$ //

(13) $y = \sin^3 x$

$y' = 3\sin^2 x(\cos x)$ //

(14) $y = \left(\frac{x-1}{x+1}\right)^4$

$z = \frac{x-1}{x+1}$

misi $u = x-1 \rightarrow u' = 1$

$v = x+1 \rightarrow v' = 1$

$z' = \frac{u'v-uv'}{v^2}$

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

$z' = \frac{2}{(x+1)^2}$

$y = z^4$

$y' = 4z^3 \cdot z'$

$= 4\left(\frac{x-1}{x+1}\right)^3 \cdot \frac{2}{(x+1)^2} \Rightarrow 8\frac{(x-1)^3}{(x+1)^5}$ //

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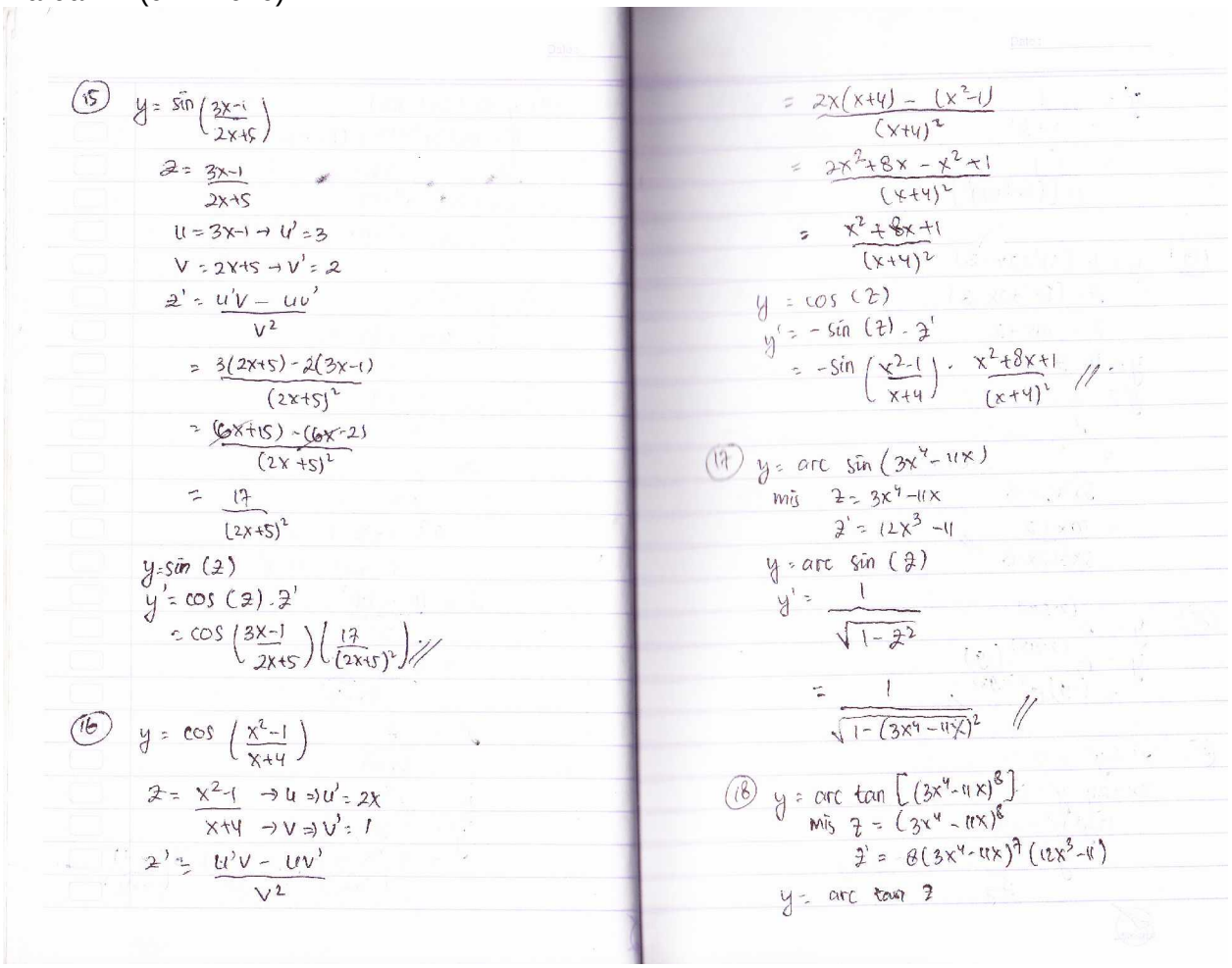

(15) $y = \sin\left(\frac{3x-1}{2x+5}\right)$

$z = \frac{3x-1}{2x+5}$

$u = 3x-1 \rightarrow u' = 3$

$v = 2x+5 \rightarrow v' = 2$

$z' = \frac{u'v - uv'}{v^2}$

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

$= \frac{(6x+15) - (6x-2)}{(2x+5)^2}$

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

$y = \sin(z)$

$y' = \cos(z) \cdot z'$

$= \cos\left(\frac{3x-1}{2x+5}\right)\left(\frac{17}{(2x+5)^2}\right)$ //

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

$z = \frac{x^2-1}{x+4} \rightarrow u \Rightarrow u' = 2x$

$\rightarrow v \Rightarrow v' = 1$

$z' = \frac{u'v - uv'}{v^2}$

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

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

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

$y = \cos(z)$

$y' = -\sin(z) \cdot z'$

$= -\sin\left(\frac{x^2-1}{x+4}\right) \cdot \frac{x^2+8x+1}{(x+4)^2}$ //

(17) $y = \text{arc}\sin(3x^4 - 11x)$

misi $z = 3x^4 - 11x$

$z' = 12x^3 - 11$

$y = \text{arc}\sin(z)$

$y' = \frac{1}{\sqrt{1-z^2}}$

$= \frac{1}{\sqrt{1-(3x^4-11x)^2}}$ //

(18) $y = \text{arc}\tan\left[(3x^4-11x)^8\right]$

misi $z = (3x^4 - 11x)^8$

$z' = 8(3x^4-11x)^7(12x^3-11)$

$y = \text{arc}\tan z$

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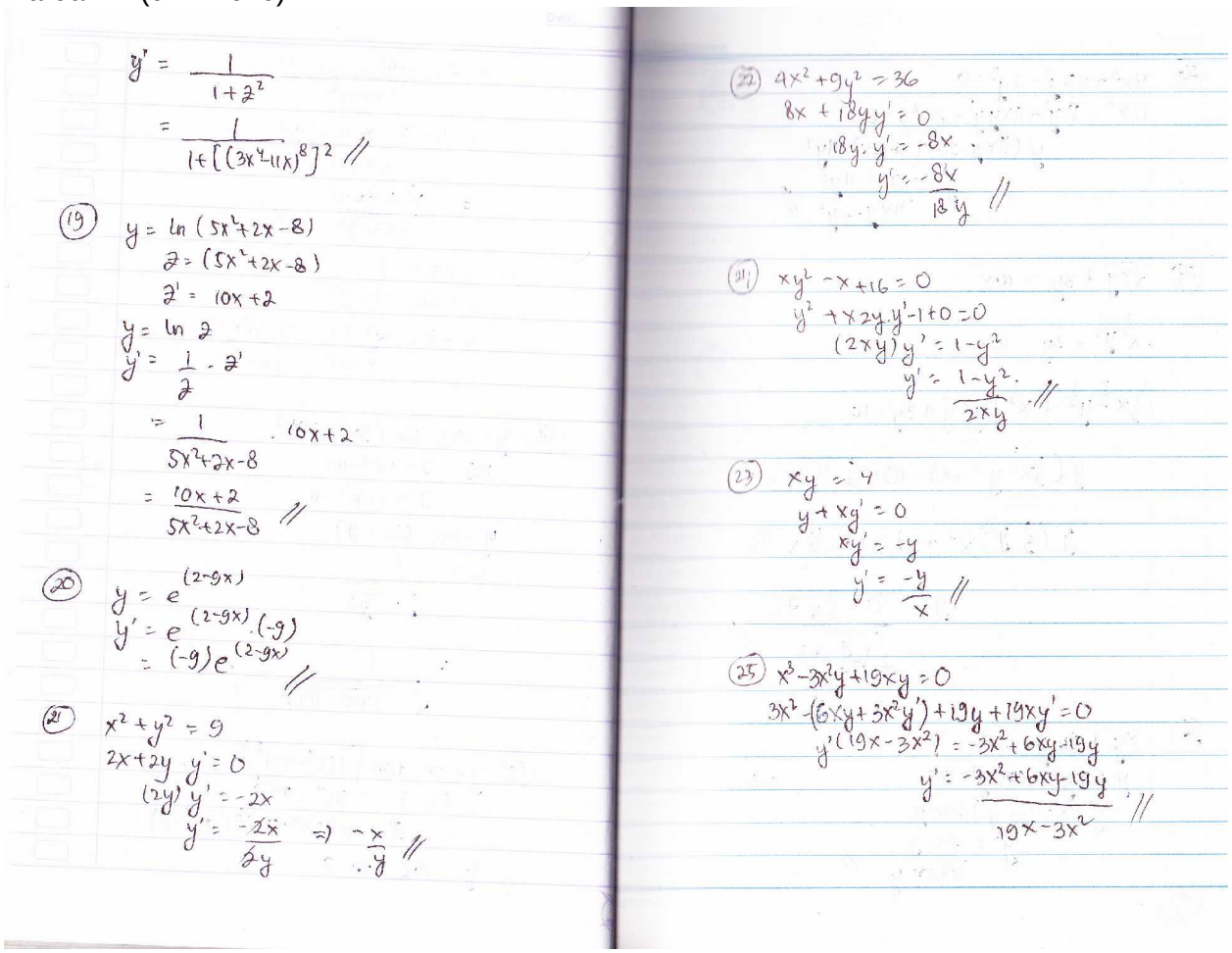

$$y' = \frac{1}{1+z^2}$$

$$= \frac{1}{1+[(3x^4-11x)^8]^2} //$$

(19) $y = \ln(5x^2+2x-8)$

$z = (5x^2+2x-8)$

$z' = 10x+2$

$y = \ln z$

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

$= \frac{1}{5x^2+2x-8} \cdot 10x+2$

$= \frac{10x+2}{5x^2+2x-8}$ //

(20) $y = e^{(2-9x)}$

$y' = e^{(2-9x)}(-9)$

$= (-9)e^{(2-9x)}$ //

(21) $x^2+y^2 = 9$

$2x+2y\,y' = 0$

$(2y)\,y' = -2x$

$y' = \frac{-2x}{2y} \Rightarrow \frac{-x}{y}$ //

(22) $4x^2+9y^2 = 36$

$8x+18yy' = 0$

$18y \cdot y' = -8x$

$y' = \frac{-8x}{18y}$ //

(24) $xy^2 - x + 16 = 0$

$y^2 + x2y\,y' - 1 + 0 = 0$

$(2xy)y' = 1-y^2$

$y' = \frac{1-y^2}{2xy}$ //

(23) $xy = 4$

$y + xy' = 0$

$xy' = -y$

$y' = \frac{-y}{x}$ //

(25) $x^3 - 3x^2y + 19xy = 0$

$3x^2 - (6xy + 3x^2y') + 19y + 19xy' = 0$

$y'(19x - 3x^2) = -3x^2 + 6xy - 19y$

$y' = \frac{-3x^2+6xy-19y}{19x-3x^2}$ //

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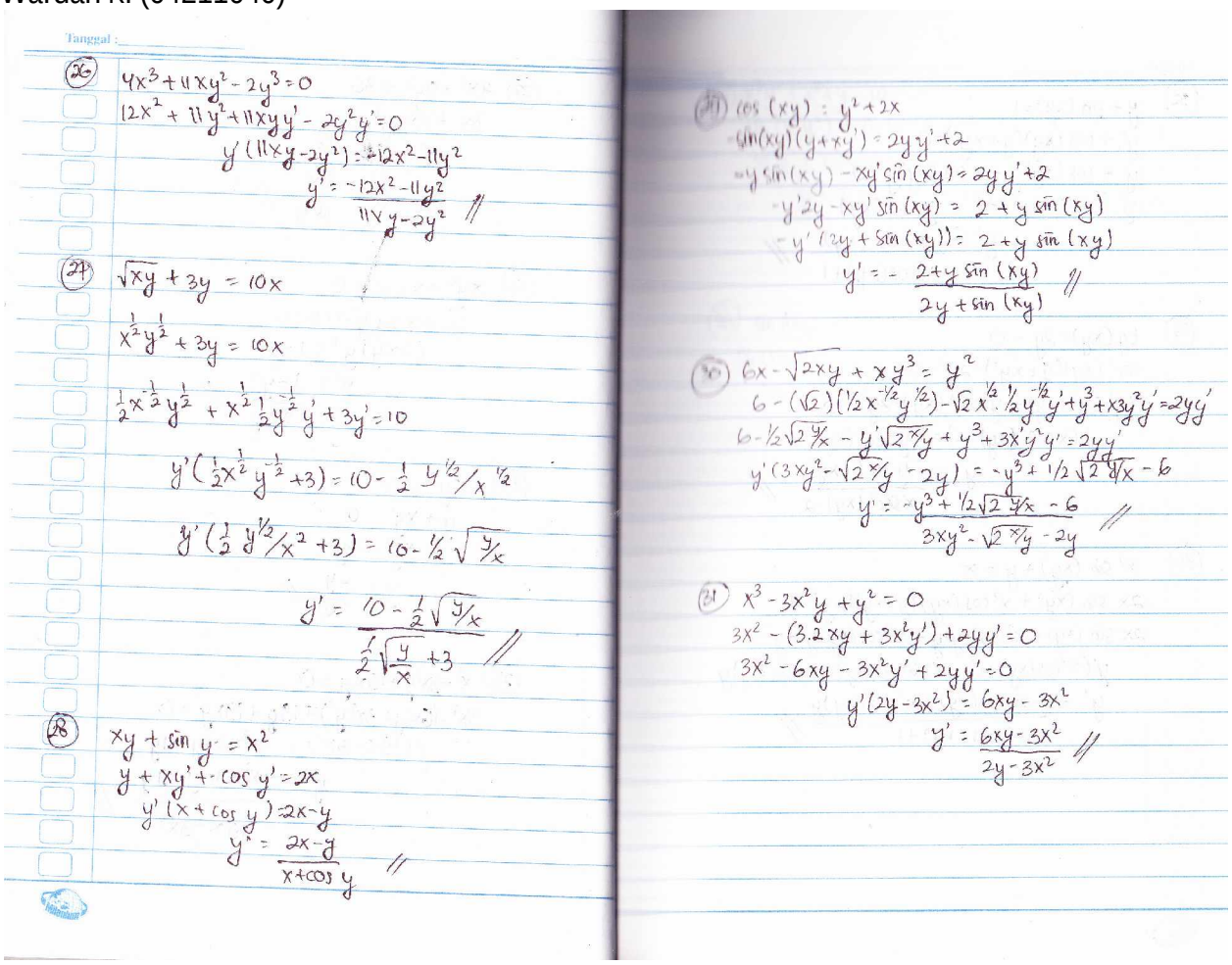

(26) $4x^3 + 11xy^2 - 2y^3 = 0$

$12x^2 + 11y^2 + 11xyy' - 2y^2y' = 0$

$y'(11xy - 2y^2) = -12x^2 - 11y^2$

$y' = \frac{-12x^2 - 11y^2}{11xy - 2y^2}$ //

(27) $\sqrt{xy} + 3y = 10x$

$x^{\frac{1}{2}}y^{\frac{1}{2}} + 3y = 10x$

$\frac{1}{2}x^{-\frac{1}{2}}y^{\frac{1}{2}} + x^{\frac{1}{2}}\frac{1}{2}y^{-\frac{1}{2}}y' + 3y' = 10$

$y'(\frac{1}{2}x^{\frac{1}{2}}y^{-\frac{1}{2}} + 3) = 10 - \frac{1}{2}y^{1/2}/x^{1/2}$

$y'(\frac{1}{2}y^{1/2}/x^2 + 3) = 10 - \frac{1}{2}\sqrt{y/x}$

$y' = \frac{10 - \frac{1}{2}\sqrt{y/x}}{\frac{1}{2}\sqrt{\frac{y}{x}} + 3}$ //

(28) $xy + \sin y = x^2$

$y + xy' + \cos y' = 2x$

$y'(x + \cos y) = 2x - y$

$y' = \frac{2x - y}{x + \cos y}$ //

(29) $\cos(xy) = y^2 + 2x$

$-\sin(xy)(y + xy') = 2yy' + 2$

$-y\sin(xy) - xy'\sin(xy) = 2yy' + 2$

$-y'2y - xy'\sin(xy) = 2 + y\sin(xy)$

$-y'(2y + \sin(xy)) = 2 + y\sin(xy)$

$y' = -\frac{2 + y\sin(xy)}{2y + \sin(xy)}$ //

(30) $6x - \sqrt{2xy} + xy^3 = y^2$

$6 - (\sqrt{2})(\frac{1}{2}x^{-1/2}y^{1/2}) - \sqrt{2}x^{1/2}\frac{1}{2}y^{-1/2}y' + y^3 + x3y^2y' = 2yy'$

$6 - \frac{1}{2}\sqrt{2}\sqrt{y/x} - y'\sqrt{2}\sqrt{x/y} + y^3 + 3xy^2y' = 2yy'$

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

$y' = \frac{-y^3 + \frac{1}{2}\sqrt{2}\sqrt{y/x} - 6}{3xy^2 - \sqrt{2}\sqrt{x/y} - 2y}$ //

(31) $x^3 - 3x^2y + y^2 = 0$

$3x^2 - (3.2xy + 3x^2y') + 2yy' = 0$

$3x^2 - 6xy - 3x^2y' + 2yy' = 0$

$y'(2y - 3x^2) = 6xy - 3x^2$

$y' = \frac{6xy - 3x^2}{2y - 3x^2}$ //

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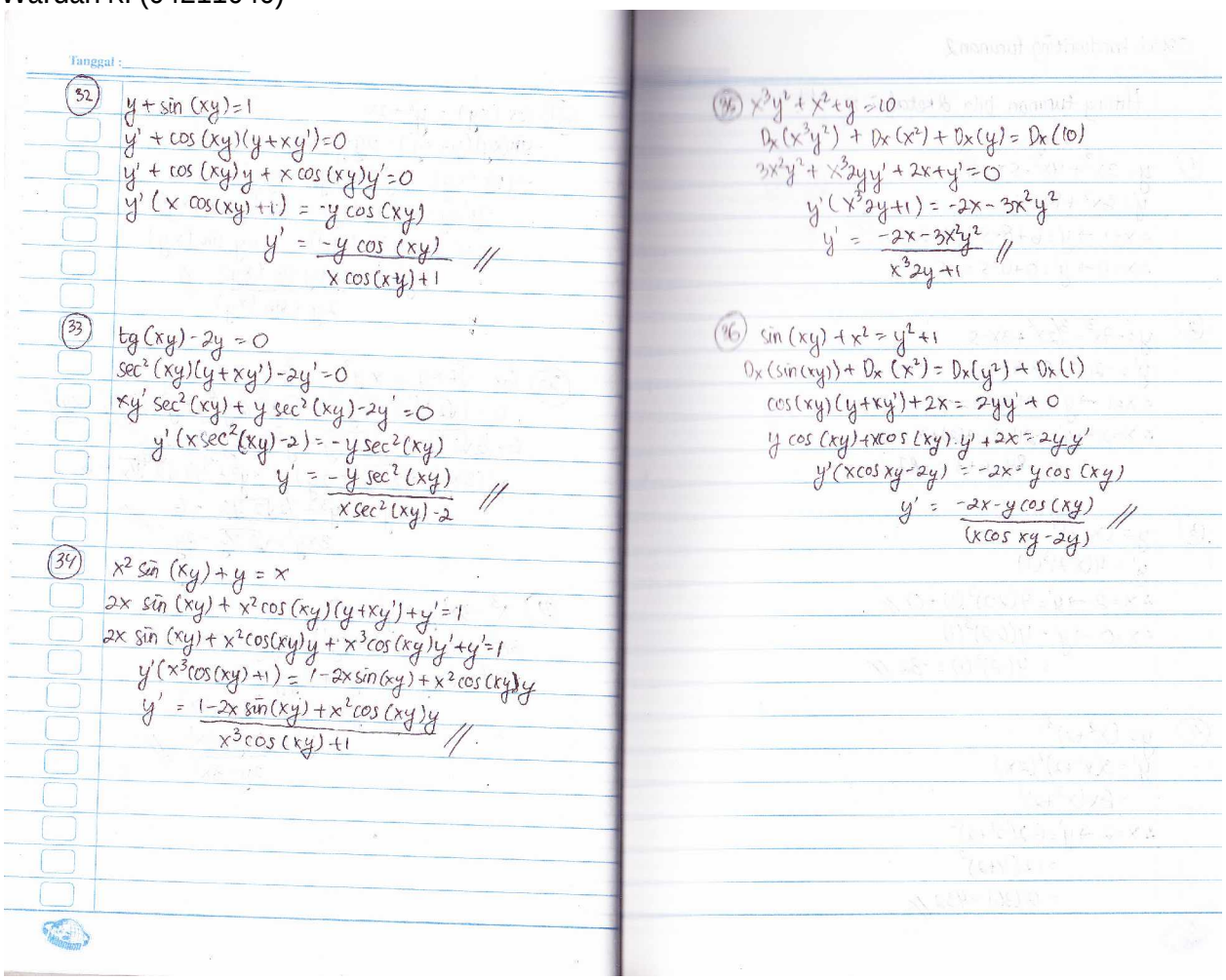

Tanggal :

(32) $y + \sin(xy) = 1$

$y' + \cos(xy)(y + xy') = 0$

$y' + \cos(xy)y + x\cos(xy)y' = 0$

$y'(x\cos(xy) + 1) = -y\cos(xy)$

$$y' = \frac{-y\cos(xy)}{x\cos(xy) + 1}$$ //

(33) $\operatorname{tg}(xy) - 2y = 0$

$\sec^2(xy)(y + xy') - 2y' = 0$

$xy'\sec^2(xy) + y\sec^2(xy) - 2y' = 0$

$y'(x\sec^2(xy) - 2) = -y\sec^2(xy)$

$$y' = \frac{-y\sec^2(xy)}{x\sec^2(xy) - 2}$$ //

(34) $x^2\sin(xy) + y = x$

$2x\sin(xy) + x^2\cos(xy)(y + xy') + y' = 1$

$2x\sin(xy) + x^2\cos(xy)y + x^3\cos(xy)y' + y' = 1$

$y'(x^3\cos(xy) + 1) = 1 - 2x\sin(xy) + x^2\cos(xy)y$

$$y' = \frac{1 - 2x\sin(xy) + x^2\cos(xy)y}{x^3\cos(xy) + 1}$$ //

(35) $x^3y^2 + x^2 + y = 10$

$D_x(x^3y^2) + D_x(x^2) + D_x(y) = D_x(10)$

$3x^2y^2 + x^3 2yy' + 2x + y' = 0$

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

$$y' = \frac{-2x - 3x^2y^2}{x^3 2y + 1}$$ //

(36) $\sin(xy) + x^2 = y^2 + 1$

$D_x(\sin(xy)) + D_x(x^2) = D_x(y^2) + D_x(1)$

$\cos(xy)(y + xy') + 2x = 2yy' + 0$

$y\cos(xy) + x\cos(xy)\cdot y' + 2x = 2yy'$

$y'(x\cos xy - 2y) = -2x - y\cos(xy)$

$$y' = \frac{-2x - y\cos(xy)}{(x\cos xy - 2y)}$$ //