TURUNAN 1

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

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

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

x^2+7 | $2x$

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

$8x^3+28x+7$

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

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

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

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

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

2. $y = (x^3+3x^2)(4x^2+2)$

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

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

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

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

$6x^2+12x$

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

$8x^4+24x^3$

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

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

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

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

$y = 1/u$

$y = u^{-1}$

$= -1u^{-2}$

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

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

4. $y = \frac{2}{5x^2-1}$

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

$y = 1/u$

$= u^{-1}$

$= -u^{-2}$

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

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

5 $y = \frac{1}{4x^2-3x+9}$

Misal $u = 4x^2-3x+9$

$u' = 8x-3$

$y = 1/u'$

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

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

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

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

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

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

$y = u/v$

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

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

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

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

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

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

$y = u/v$

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

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

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

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

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

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

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

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

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

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

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

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

5. $x^3y^2 + x^2 + y = 10$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Implicit

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

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

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

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

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

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) $\tan(xy)-2y=0$

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

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

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

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