NAMA :FAIZ HIDAYAT

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KELAS IF1A

1. tentukan persamaan garis singgung pada titik berikut.

$1a.\ y = 1 - 2x - 3x^2\ pada\ titik\ (-2, -7)$

$f(x) = 1 - 2x - 3x^2$

$f(-2) = 1 - 2(-2) - 3(-2)^2$

$= 1 + 4 - 12$

$f(x) = -7$

$f(x + h) = 1 - 2(x + h) - 3(x + h)^2$

$f(-2 + h) = 1 - 2(-2 + h) - 3(-2 + h)^2$

$= 1 + 4 - 2h - 3(4 - 4h + h^2)$

$= 5 - 2h - 12 + 12h - 3h^2$

$f(x + h) = -7 + 10h - 3h^2$

$$f'(x) = \lim_{h \to 0} \frac{f(x + h) - f(x)}{h} = \lim_{h \to 0} \frac{f(-7 + 10h - 3h^2) - f(-7)}{h}$$

$$= \lim_{h \to 0} \frac{-7 + 10h - 3h^2 + 7}{h}$$

$$= \lim_{h \to 0} \frac{-7 + 7 + h(10 - 3h)}{h}$$

$$= \lim_{h \to 0} 10 - 3h$$

$$= 10 - 3(0)$$

$$= 10$$

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

$y - (-7) = 10(x - (-2))$

$y + 7 = 10(x + 2)$

$y = 10x + 20 - 7$

$y = 10x + 13$

$1b.\ y = \frac{1}{x^2}\ di\ titik\ (1,1)$

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

$f(1) = 1^{-2}$

$= 1$

$f(x+h) = (x+h)^{-2}$

$f(1+h) = (1+h)^{-2}$

$= (1+2h+h^2)^{-1}$

$= \frac{1}{1+2h+h^2}$

$$m = f'(x) = \lim_{h\to 0}\frac{f(x+h)-f(x)}{h} = \lim_{h\to 0}\frac{\frac{1}{1+2h+h^2}-1}{h}$$

$$= \lim_{h\to 0}\frac{\frac{1}{1+2h+h^2}-\frac{1(1+2h+h^2)}{1+2h+h^2}}{h}$$

$$= \lim_{h\to 0}\frac{1-(1+2h+h^2)}{h}$$

$$= \lim_{h\to 0}\frac{1-1-2h-h^2}{h}$$

$$= \lim_{h\to 0}\frac{h(-2-h)}{h}$$

$$= \lim_{h\to 0} -2-h$$

$$= -2$$

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

$y - 1 = -2(x-1)$

$y = -2x + 2 + 1$

$y = -2x + 3$

2. tentukan turunan fungsi-fungsi berikut:

$2a.\ G(y) = (y^2+1)(2y-7)$

$G(y) = 2y^3 - 7y^2 + 2y - 7$

$f'(y) = a.ny^{n-1}$

$G'(y) = 2(3)y^{3-1} - 7(2)y^{2-1} + 2y^{1-1} + 0$

$G'(y) = 6y^2 - 14y + 2$

$2b. h(x) = \dfrac{ax+b}{cx+d}$

$h(x) = \dfrac{ax+b}{cx+d}$

$h'(x) = \dfrac{d}{dx}\left(\dfrac{ax+b}{cx+d}\right)$

$aturan\ turunan$

$\dfrac{d}{dx}\left(\dfrac{f}{g}\right) = \dfrac{\frac{d}{dx} \times f \times g - f \times \frac{d}{dx} \times g}{g^2}$

$h'(x) = \dfrac{\frac{d}{dx}(ax+b)(cx+d) - (ax+b)\frac{d}{dx}(cx+d)}{(cx+d)^2}$

$h'(x) = \dfrac{\left(\frac{d}{dx}ax + \frac{d}{dx}b\right)(cx+d) - (ax+b)\left(\frac{d}{dx}cx + \frac{d}{dx}d\right)}{(cx+d)^2}$

$h'(x) = \dfrac{a(cx+d) - (ax+b)c}{(cx+d)^2}$

$h'(x) = \dfrac{ad - bc}{(cx+d)^2}$

$2c.\ y = a + \dfrac{b}{x} + \dfrac{c}{x^2}$

$f(x) = a + bx^{-1} + cx^{-2}$

$f'(x) = nX^{n-1}$

$f'(x) = 0 + (-bx^{-1-1}) + (-2cx^{-2-1})$

$= -bx^{-2} - 2cx^{-3}$

$= -b\dfrac{1}{x^2} - 2c\dfrac{1}{x^3}$

$= -\dfrac{b}{x^2} - \dfrac{2c}{x^3}$

3. carilah turunan kedua untuk fungsi-fungsi berikut

$3a.\ 3x^3 + 3x^2y - 8xy^2 + 2y^3 = 0$

$$\frac{d}{dx}(3x^3)+\frac{d}{dx}(3x^2y)-\frac{d}{dx}(8xy^2)+\frac{d}{dx}(2y^3)=0$$

$$9x^2+\frac{d}{dx}(3x^2)y+3x^2\frac{d}{dx}(y)-\left(\frac{d}{dx}(8x)y^2+8x\frac{d}{dx}(y^2)\right)+\frac{d}{dy}(2y^3)\times\frac{dy}{dx}=0$$

$$9x^2+6xy+3x^2\frac{d}{dy}(y)\frac{dy}{dx}-8y^2-8x\frac{d}{dy}(y^2)\frac{dy}{dx}+6y^2\frac{dy}{dx}=0$$

$$9x^2+6xy+3x^2\frac{dy}{dx}-8y^2-16xy\frac{dy}{dx}+6y^2\frac{dy}{dx}=0$$

$$3x^2\frac{dy}{dx}-16xy\frac{dy}{dx}+6y^2\frac{dy}{dx}=-9x^2-6xy+8y^2$$

$$\frac{dy}{dx}(3x^2-16xy+6y^2)=-9x^2-6xy+8y^2$$

$$\frac{dy}{dx}=\frac{-9x^2-6xy+8y^2}{3x^2-16xy+6y^2}$$

$3b.\,xy+y^3=2$

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

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

$aturan\ turunan\ \frac{d}{dx}\left(\frac{a}{f}\right)=-a\frac{f'}{f^2}$

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

$f''(x)=-2\frac{1x^{1-1}+0}{(x+y^3)^2}$

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

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

$c.\,y=x^3In(x^2+1)$

$y=x^3In(x^2+!)$

$y'=\frac{d}{dx}\left(x^3In(x^2+1)\right)$

$y'=\frac{d}{dx}(x^3)In(x^2+1)+x^3\frac{d}{dx}\left(In(x^2+1)\right)$

$untuk\ \frac{d}{dx}\left(In(x^2+1)\right)\ menggunakan\ aturan\ rantai\ \frac{d}{dx}\left(f(g)\right)=\frac{d}{dx}\left(f(g)\right)\frac{d}{dx}(g)\ dimana\ g=x^2+1$

$$y'=3x^2In(x^2+1)+x^3\frac{d}{dg}\left(In(g)\right)\frac{d}{dx}(x^2+1)$$

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

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

$$y'=3x^2In(x^2+1)+\frac{2x^4}{x^2+1}$$