

Tugas 8 Turunan

No.

Date

Nama : Varian Avila Faldi

NPM : 140810210055

$$1. f(x) = \begin{cases} x^2 - 1, & x < 3 \\ 2ax + b, & x \geq 3 \end{cases}$$

Agar $f(x)$ terdiferensiabel di $x=3$

• $f(x)$ kontinu di $x=3$

$$f(3) = \lim_{x \rightarrow 3^-} = \lim_{x \rightarrow 3^+}$$

$$\Rightarrow 9 - 1 = 6a + b$$

$$6a + b = 8$$

$$\bullet \lim_{x \rightarrow 3^+} \frac{2ax + b - 2a \cdot 3}{x - 3}$$

$$\lim_{x \rightarrow 3^+} \frac{2a(x-3)}{x-3} = 2a$$

$$\bullet \lim_{x \rightarrow 3^-} \frac{x^2 - 1 - (6a + b)}{x - 3}$$

$$\lim_{x \rightarrow 3^-} \frac{x^2 - 1 - 8}{x - 3}$$

$$\lim_{x \rightarrow 3^-} \frac{x^2 - 9}{x - 3}$$

$$\lim_{x \rightarrow 3^-} \frac{(x+3)(x-3)}{x-3} = 6$$

$$\therefore \lim_{x \rightarrow 3^+} = \lim_{x \rightarrow 3^-}$$

$$\bullet 2a = 6$$

$$a = 3$$

$$\bullet 6a + b = 8$$

$$18 + b = 8$$

$$b = -10$$

$$2. f(x) = x^{1/2} + \sqrt[3]{x^2} + 1$$

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

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

$$3. y = (2x-3)^{10}$$

$$y' = 10(2x-3)^9 \cdot 2$$

$$= 20(2x-3)^9$$

$$4. y = \sin^3 x$$

$$y' = 3 \sin^2 x \cdot \cos x \cdot 1$$

$$5. y = \cos^4(4x^2 - x)$$

$$y' = 4 \cos^3(4x^2 - x) \cdot -\sin(4x^2 - x) \cdot (8x - 1)$$

$$= -(32x - 4) \cos^3(4x^2 - x) \cdot \sin(4x^2 - x)$$

$$6. y = (2x-3)^9$$

$$y' = 9(2x-3)^8 \cdot 2$$

$$= 18(2x-3)^8$$

$$y'' = 144(2x-3)^7 \cdot 2$$

$$= 288(2x-3)^7$$

7

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

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

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

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

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

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

8

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

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

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

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

$$y'(1 + x \cos(xy)) + y \cos(xy) = 0$$

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