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Kelas : IF3A

1. Tentukan persamaan garis singgung pada kurva berikut pada titik

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

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

2. tentukan turunan fungsi-fungsi berikut:

a. $G(x) = (y^2 + 1)(2y - 7), h(x) = \frac{(ax + b)}{(cx + d)}$

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

3. carilah turunan kedua untuk fungsi-fungsi di bawah ini

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

b. $xy + y^3 = 2$

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

jawab

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

$$x_1 = -2 \quad m = F'(x) = Y'$$

$$y = -7$$

$$y' = 2 - 6x$$

$$y = 2 - 6(-2)$$

$$y = 2 + 12$$

$$y = 14$$

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

$$y - (-7) = 14(x - (-2))$$

$$y + 7 = 14(x + 2)$$

$$y + 7 = 14x + 28$$

$$y = 14x + 28 - 7$$

$$y = 14x + 21$$

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

$$x_1 = 1$$

$$y_1 = 1$$

$$m = F'(x) = y'$$

$$v = 1 \quad u = x^2$$

$$v = 0 \quad u = 2x$$

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

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

$$y - 1 = -2x + 2$$

$$y = -2x + 2 + 1$$

$$y = -2x + 3$$

$$y' = \frac{(10)(-x^2)(2x)}{(x^2)^2}$$

$$y = \frac{0-2x}{x^4} = \frac{-2}{x^3}$$

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

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

misal,

$$u = y^2 + 1 \quad v = 2y - 7$$

$$u' = 2y \quad v' = 2$$

$$G'(x) = vv' + uu'$$

$$G'(x) = (2y - 7)(2) + (y^2 + 1)(2y)$$

$$G'(x) = 4y - 14 + 2y^3 + 2y$$

$$G'(x) = 2y^3 + 6y - 14$$

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

jawab

$$u = ax + b \quad u' = a$$

$$v = cx + d \quad v' = c$$

$$f(x)' = \frac{u'v - uv'}{u^2}$$

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

$$f(x)' = \frac{(acx+ad) - (acx+bc)}{(ax+b)^2}$$

$$f(x)' = \frac{acx - acx + ad - bc}{(ax+b)^2}$$

$$f(x)' = \frac{ad - bc}{(ax+b)^2}$$

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

jawab

$$\frac{d}{dx}(a) + \frac{d}{dx}\left(\frac{b}{x}\right) + \frac{d}{dx}\left(\frac{c}{x^2}\right) = 0 - \frac{b}{x^2} - \frac{2c}{x^3} = -\frac{b}{x^2} - \frac{2c}{x^3}$$

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

jawab

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

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

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

$$9x^2 + 6xy + 3x^2(1)\frac{dy}{dx} - (8y + 16xy\frac{d}{dx}(y)) + 2(3y^2)\frac{dy}{dx} = 0$$

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

$$9x^2 + 6xy + 3x^2 \frac{dy}{dx} - (8y^2 + 16xy(1) \frac{dy}{dx}) + 6y^2 \frac{dy}{dx} = 0$$

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

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

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

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

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

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

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

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

$$\frac{d}{dx}(x)y + x \frac{d}{dx}(y) + \frac{d}{dy}(y^3) \frac{dy}{dx} = 0$$

$$1y + x \frac{d}{dy}(y) \frac{dy}{dx} + 3y^2 \frac{dy}{dx} = 0$$

$$y + x(1) \frac{dy}{dx} + 3y^2 \frac{dy}{dx} = 0$$

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

$$(x + 3y^2) \frac{dy}{dx} = -y$$

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

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

3.c. $y = x^3 \times \ln(x^2 + 1)$

$$y' = \frac{d}{dx}(x^3 \times \ln(x^2 + 1))$$

$$y' = \frac{d}{dx}(x^3) \times \ln(x^2 + 1) + x^3 \frac{d}{dx}(\ln(x^2 + 1))$$

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

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

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

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

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