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## Tugas 12

1). Cari turunan pertama dari

$$a) \quad f(x) = \frac{x^3 + 4}{2x + 5} \rightarrow u = 3x^2 \quad v = 2$$

$$\begin{aligned} f'(x) &= \frac{u'v - uv'}{v^2} \\ &= \frac{3x^2(2x+3) - (x^3+4)(2)}{(2x+3)^2} \\ &= \frac{6x^3 + 9x^2 - (2x^3 + 8)}{(2x+3)^2} \\ &= \frac{4x^3 + 9x^2 - 8}{4x^2 + 12x + 9} \end{aligned}$$

$$b) \quad f(x) = 4\sqrt{x^3}$$

$$\begin{aligned} f(x) &= 4\sqrt{x^3} = 4(x^3)^{1/2} = 4x^{3/2} \\ f'(x) &= \frac{3}{2} \cdot 4x^{3/2-1} \\ &= 6x^{1/2} = 6\sqrt{x} \end{aligned}$$

$$c) \quad f(x) = -(\cos^2 x - \sin^2 x)$$

$$= -(\cos^2 x + \sin^2 x)$$

$$= -(1 - 2 \sin^2 x) = (-1 + 2 \sin^2 x)$$

Maka turunannya misal  $u$ ,  $\sin x$ ,  $u' = \cos x$ 

$$\text{maka } f'(x) = -1 + 2u^2$$

$$f'(x) = -1 + 2(\sin^2 x)^2 \cdot \cos x$$

$$= 4u^2 \cdot u'$$

$$= 4 \sin x \cdot \cos x$$

$$d) \quad f(x) = x^3 - 2x^2 + 8x - 100 + 2\sqrt{x}$$

$$= x^3 - 2x^2 + 8x + 2x^{1/2} - 100$$

$$f'(x) = 3x^{3-1} - (2)2x^{3-1} + (1)8x^{1-1} + \left(\frac{1}{2}\right)2x^{1/2-1} - 0$$

$$= 3x^2 - 4x + 8 + x^{-1/2}$$

$$= 3x^2 - 4x + 8 + \frac{1}{\sqrt{x}}$$

2). cari turunan kedua dari

$$e. F(x) = \frac{x^3 + 4}{2x + 5}$$

$$\text{turunan pertama } P'(x) = \frac{4x^2 + 9x - 8}{4x^2 + 12x + 25}$$

turunan kedua :

$$U = 4x^3 + 9x^2 - 8, U' = 12x^2 + 18$$

$$V = 4x^2 + 12x + 25, V' = 8x + 12$$

$$P''(x) = \frac{U'V - UV'}{V^2} = \frac{(12x^2 + 18)(4x^3 + 12x + 25) - (4x^3 + 9x^2 - 8)(8x + 12)}{(4x^2 + 12x + 25)^2}$$

$$= \frac{(48x^4 + 144x^3 + 108x^2 + 72x^2 + 216x + 162) - (32x^4 + 96x^3 + 72x^2 + 108x^2 - 64x - 96)}{16x^4 + 96x^3 + 48x^2 + 108x + 81}$$

$$f. F(x) = 4\sqrt[3]{x^6}$$

$$\text{Turunan pertama} = G(x)^{1/3}$$

Turunan kedua :

$$P''(x) = \frac{1}{2} \cdot 6x^{1/2-1}$$

$$= 3x^{-1/2} = \frac{3}{\sqrt{x}}$$

$$g). f(x) = -(\cos^2 x - 3\sin^2 x)$$

$$P'(x) = 6\sin x \cdot \cos x$$

$$P''(x) = ?$$

$$U = 4\sin x, U' = 4\cos x$$

$$V = \cos x, V' = -\sin x.$$

$$P''(x) = U'V + UV'$$

$$= (4\cos x)(\cos x) + (4\sin x)(-\sin x)$$

$$= 4\cos^2 x - 4\sin^2 x$$

$$h. f(x) = x^3 - 2x^2 + 8x + 100 + 2\sqrt{x}$$

$$F''(x) = (2)3x^{2-1} - (1)4x^{1-1} + 0 + (-\frac{1}{2})x^{-1/2-1}$$

$$= 6x - 4 - \frac{1}{2}x^{-3/2}$$

$$= 6x - 4 - \frac{1}{2\sqrt{x^3}}$$