

1) Dengan menggunakan metode Substitusi, hingga hasil integral benar.

$$\int_1^e \frac{4 \ln u}{u} du$$

2) Misalkan

$$f(u) = \frac{(u-1)^3 \cdot (u+1)^7}{\sqrt{2u+1}}$$

Dengan menggunakan turunan logaritma, tentukan $f'(0)$.

Jawab

$$1. \int_1^e \frac{4 \ln u}{u} du$$

Substitusi, $t = \ln u$

$$t' = \frac{1}{u}$$

$$du = \frac{dt}{t'} \Leftrightarrow du = \frac{dt}{\frac{1}{u}} \Leftrightarrow \frac{1}{u} du = dt$$

$$\int_1^e \frac{4 \ln u}{u} du = \int_1^0 4t dt$$

$$= \left[\frac{4t^2}{2} \right]_1^0$$

$$= \left[2t^2 \right]_1^0$$

$$= \left[2 \ln^2 u \right]_1^e$$

$$= 2 \ln^2 e - 2 \ln^2 1$$



$$2 \quad f(u) = \frac{(u-1)^3 (u+1)^5}{\sqrt{2u+1}}$$

$$(i) \ln f(u) = \ln \frac{(u-1)^3 (u+1)^5}{\sqrt{2u+1}}$$

$$(ii) \ln f(u) = 3 \ln(u-1) + 5 \ln(u+1) - \frac{1}{2} \ln(2u+1)$$

Tentukan Implisit

$$\ln f(u) - 3 \ln(u-1) - 5 \ln(u+1) + \frac{1}{2} \ln(2u+1) = 0$$

$$\frac{d}{du} = \frac{d}{du} (\ln f(u) - 3 \ln(u-1) - 5 \ln(u+1) + \frac{1}{2} \ln(2u+1))$$

$$= 0 - 3 \frac{1}{u-1} - 5 \frac{1}{u+1} + \frac{1}{2} \frac{1}{2u+1} = -\frac{3}{u-1} - \frac{5}{u+1} + \frac{1}{4u+2}$$

$$= \frac{-15u^2 - 4u + 1}{2u^3 + u^2 - 2u - 1}$$

$$\frac{d}{df(u)} : \frac{d}{df(u)} (\ln f(u) - 3 \ln(u-1) - 5 \ln(u+1) + \frac{1}{2} \ln(2u+1)) = \frac{1}{f(u)}$$

$$\frac{d f(u)}{du} = \frac{\frac{d}{du}}{\frac{d}{df(u)}} = \frac{-15u^2 - 4u + 1}{2u^3 + u^2 - 2u - 1} \cdot \frac{1}{f(u)}$$

$$f'(u) = \frac{(-15u^2 - 4u + 1) f(u)}{2u^3 + u^2 - 2u - 1}$$

$$f'(0) = \frac{(-15 \cdot 0^2 - 4 \cdot 0 + 1) \cdot (-1)}{2 \cdot 0^3 + 0^2 - 2 \cdot 0 - 1}$$

$$= \frac{(-1)}{-1} \quad (1) \quad -1 //$$