

Riemann Integral

1. $\int \frac{1}{2x-1} du$ (Calculus)

$$\rightarrow \int \frac{1}{(2u-1)} du = \int \frac{1}{u^3} \cdot \frac{du}{2} \cdot \frac{1}{2} \int u^3 du$$

$$= \frac{1}{2} - \left(\frac{u^{-2}}{-2} \right) = \frac{1}{4(2u-1)} + C$$

2. $\int (2u+1)(u-5) du$: (Calculus).

$$\rightarrow \int (2u^2 - 10u + u - 5) du = \int (2u^2 - 9u - 5) du = \int \frac{2u^3}{3} - \frac{9u^2}{2} - 5u + C$$

3. $\int_1^3 \left(5u^2 - 6u + \frac{12}{u^3} \right) du$: (Calculus).

$$\rightarrow \int_1^3 5u^2 du + \int_1^3 6u du + \int_1^3 \frac{12}{u^3} du$$

$$= \int_1^3 5u^2 du = 5u^3 \Big|_1^3 = 5(3)^3 - 5(1)^3 = 15 \cdot 5 - 10$$

$$= \int_1^3 \frac{6}{u} du = 6 \ln |x| \Big|_1^3 = 6 \ln(3) - 6 \ln(1) = 6 \ln(3)$$

$$\int_1^3 \frac{11}{u^5} du = -\frac{12}{u} \Big|_1^3 = \frac{12}{3} - \frac{12}{1} = -4 + 12 = 8$$

$$= 10 + 6 \ln(3) + 8$$

$$= 18 + 6 \ln(3)$$

4. $\int_{-1}^2 (2u^2 - 3)^2 du$ (Calculus)

$$(2u^2 - 3)^2 = 4u^4 - 12u^2 + 9$$

$$\int_{-1}^2 (4u^4 - 12u^2 + 9) du = \int_{-1}^2 4u^4 du - \int_{-1}^2 12u^2 du + \int_{-1}^2 9 du$$

$$\int_{-1}^2 4u^4 du = 4 \cdot \frac{u^5}{5} \Big|_{-1}^2 = \frac{4}{5} (32 - (-1)) = \frac{132}{5}$$

$$\int_{-1}^2 12u^2 du = 12 \cdot \frac{u^3}{3} \Big|_{-1}^2 = 4(8 - (-1)) = 4 \cdot 9 = 36$$

$$\int_{-1}^2 9 du = 9x \Big|_{-1}^2 = 9(2 - (-1)) = 9 \cdot 3 = 27$$

$$\frac{132}{5} + 36 + 27 = \frac{132 + 180 + 135}{5} = \frac{447}{5}$$

5 - Calculate the bounded area $y = u^3$ and the x-axis for the range $u: (0,1)$ and $N = 20$ Using the Riemann integral method (numerical and Calculus) and Calculate the error!

Kalkulus
 $C = \int_0^1 u^3 du = \int u^3 du = \frac{u^4}{4} + C$

$$\left(\frac{u^4}{4} \right)_0^1 = \frac{1}{4} \cdot \frac{0^4}{4} = \frac{1}{4} \cdot 0 = \frac{1}{4} = 0,25$$

Numerik

$x_1 = (1-0,5^i)$ 0,05		$f(u_1) \cdot (u)^3$ 0,0253	$W(u_1)_{\text{ud}}$
1	0,005	0,000015625	0,00000078125
2	0,075	0,000421875	0,00002109375
3	0,125	0,001953125	0,00009765625
4	0,175	0,00539375	0,00026796875
5	0,275	0,011390625	0,00056953125
6	0,175	0,02776075	0,00103904575
7	0,325	0,034328125	0,00191840625
8	0,375	0,052734375	0,00263671875
9	0,415	0,07660625	0,00383201125
10	0,475	0,107171875	0,0055859375
11	0,525	0,144703125	0,00722515625

No.

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12	0,575	0,190109375	0,009505000
13	0,625	0,2441063	0,01220703125
14	0,675	0,3075968	0,01537734375
15	0,715	0,380070125	0,1900390625
16	0,775	0,464053125	0,232266625
17	0,815	0,560390625	0,2801953125
18	0,875	0,669921875	0,1003490625
19	0,915	0,791615625	0,1095500125
20	0,971	0,923515625	0,4617578125

L : 0,249334375

error : Luas Persegi - Luas Kalah

= 0,249334375 - 0,5

Persentase : 0,266%