Sandy, Okuyakabasi-U.
19/MHS01/395
MBBS

$u = x^2 + 1$

$\frac{\delta u}{\delta x}$

Assignment

1. $\int 11 - 3x / (x^2 + 2x - 3) \, \delta x$

2. $\int 4x - 16 / (x^2 - 2x - 3) \, \delta x$

3. $\int (2x^2 - 9x - 35) / (x+1)(x-2)(x+3)$

solution

1) $\int \frac{11 - 3x}{(x^2 + 2x - 3)} \delta x$

$$\frac{11 - 3x}{(x+3)(x-1)} = \frac{A}{(x+3)} + \frac{B}{(x-1)}$$

$$\frac{11 - 3x}{(x+3)(x-1)} = \frac{A(x-1) + B(x+3)}{(x+3)(x-1)}$$

$$11 - 3x = A(x-1) + B(x+3)$$

$f(-3)$

$11 - 3(-3) = A(-3) - 1)$

$20 = -4A$

$A = -5$

$f(1) \Rightarrow 11 - 3(1) = B(1+3)$

$\Rightarrow 8 = 4B$

$B = 2$

$$\int \frac{11 - 3x}{(x+3)(x-1)} \delta x = \int \frac{-5}{(x+3)} \delta x + \int \frac{2}{(x-1)} \delta x$$

let

$\cancel{\int \frac{11 - 3x}{(x+3)(x+1)} \delta x = \int \frac{-5}{(x}}$

$$\int \frac{-5}{(x+3)} \delta x$$

$$+\int \frac{2}{x-1}\,\delta x$$

let $u = x+3$

$$\frac{\delta u}{\delta x} = 1$$

$$\delta x = \frac{\delta u}{1}$$

$$\int \frac{-5}{u} \cdot \frac{\delta u}{1}$$

$$-5\int \frac{1}{u}\,\delta u$$

$$= -5\ln(u)$$

$$= -5\ln(x+3)$$

let $u = x-1$

$$\frac{\delta u}{\delta x} = 1$$

$$\delta x = \frac{\delta u}{1}$$

$$= \int \frac{2}{u} \cdot \delta u$$

$$= 2\int \frac{1}{u}\,\delta u$$

$$= 2\ln u$$

$$= 2\ln(x-1)$$

$$\therefore \int \frac{11-3x}{(x^2+2x-3)} = 2\ln(x-1) - 5\ln(x+3)$$

2) $$\int \frac{4x-16}{(x^2-2x-3)}$$

$$\frac{4x-16}{(x-3)(x+1)} = \frac{A}{(x-3)} + \frac{B}{(x+1)}$$

$$\frac{4x-16}{(x-3)(x+1)} = \frac{A(x+1)+B(x-3)}{(x-3)(x+1)}$$

$$4x-16 = A(x+1) + B(x-3)$$

$\cancel{f(3)}$

$\cancel{A}$

$$f(3) \Rightarrow 4(3)-16 = A(3+1)$$

$$-4 = 4A$$

$$A = -1$$

$\Rightarrow -20 = B - 4B$

$B = \frac{\cancel{-20}\ 5}{+4}$

$B = 5$

$\frac{4x-16}{(x-3)(x+1)} = \int \frac{-1}{(x-3)} \delta x + \int \frac{5}{(x+1)} \delta x$

$\frac{-1}{(x-3)}$ let $u = (x-3)$

$= \frac{\delta u}{\delta x} = 1$

$= \delta x = \frac{\delta u}{1}$

$= \int \frac{-1}{(x-3)} \cdot \frac{\delta u}{1}$

$= -1 \int \frac{1}{u} \cdot \frac{\delta u}{1}$

$= -1 \ln u$

$= \frac{5}{(x+1)}$ let $u = x+1$

$= \frac{\delta u}{\delta x} = 1$

$= \delta x = \frac{\delta u}{1}$

$= \int \frac{5}{u} \cdot \frac{\delta u}{1}$

$= 5 \int \frac{1}{u} \delta u$

$= 5 \ln u$

$\therefore \int \frac{4x-16}{x^2-2x-3} = 5 \ln u - \ln u$

$\int \frac{4x-16}{x^2-2x-3} = 5 \ln(x+1) - \ln(x-3)$

3) $\int \frac{2x^2-9x-35}{(x+1)(x-2)(x+3)}\,\delta x$

$$\frac{2x^2-9x-35}{(x+1)(x-2)(x+3)} = \frac{A}{(x+1)} + \frac{B}{(x-2)} + \frac{C}{(x+3)}$$

$$\frac{2x^2-9x-35}{(x+1)(x-2)(x+3)} = \frac{A(x-2)(x+3)+B(x+1)(x+3)+C(x+1)(x-2)}{(x+1)(x-2)(x+3)}$$

$$2x^2-9x-35 = A(x-2)(x+3)+B(x+1)(x+3)+C(x+1)(x-2)$$

$f(-1) \Rightarrow 2x^2-9x-35 = A(x-2)(x+3)$

$\Rightarrow 2(-1)^2-9(-1)-35 = A(-1-2)(-1+3)$

$\Rightarrow -24 = -6A$

$A = \frac{-24}{-6}$

$A = 4$

$f(2) \Rightarrow 2(2)^2-9(2)-35 = B(2+1)(2+3)$

$\Rightarrow 8-18-35 = 15B$

$\Rightarrow -45 = 15B$

$B = -3$

$f(-3) \Rightarrow 2(-3)^2-9(-3)-35 = C(-3+1)(-3-2)$

$\Rightarrow 18+27-35 = 10C$

$\Rightarrow 10 = 10C$

$C = \frac{10}{10}$

$C = 1$

$$\int \frac{2x^2-9x-35}{(x+1)(x-2)(x+3)}\,\delta x = \int \frac{4}{(x+1)}\,\delta x + \int \frac{-3}{(x-2)}\,\delta x + \int \frac{1}{(x+3)}\,\delta x$$

$\Rightarrow \int \frac{4}{(x+1)}\,\delta x$ + $\Rightarrow \int \frac{-3}{(x-2)}\,\delta x$ + $\int \frac{1}{(x+3)}\,\delta x$

let $u = x+1$; let $u = x-2$; let $u = x+3$

$\frac{\delta u}{\delta x} = 1$; $= \frac{\delta u}{\delta x} = 1$; $= \frac{\delta u}{\delta x} = 1$

$\delta x = \frac{\delta u}{1}$; $= \delta x = \frac{\delta u}{1}$; $> \delta x = \frac{\delta u}{1}$

$\int \frac{4}{u}\frac{\delta u}{1}$; $= \int \frac{-3}{u}\frac{\delta u}{1}$; $\int \frac{1}{u}\frac{\delta u}{1}$

$4\int \frac{1}{u}\,\delta u$; $= -3\int \frac{1}{u}\,\delta u$; $= \frac{1}{1}\int \frac{1}{u}\,\delta u$

$4 \ln u$; $= -3 \ln u$; $= \ln u$

$4\ln(x+1)$ + $-3\ln(x-2)$ + $\ln(x+3)$

$$\therefore \int \frac{2x^2-9x-35\,\delta x}{(x+1)(x-2)(x-3)} = 4\ln(x+1) + \ln(x+3) - 3\ln(x-2)$$

or

$$\int \frac{2x^2-9x-35\,\delta x}{(x+1)(x-2)(x-3)} = 4\ln(x+1) - 3\ln(x-2) + \ln(x+3)$$