Solution

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

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

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

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

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

$F(-3)$

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

$20 = -4A$

$A = 5$

$F(1)$

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

$8 = 4B$

$B = 2$

~~Put sub A and B into~~ (1)

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

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

let $u = x+3$

$\frac{du}{dx} = 1$

$\int \frac{2}{(x-1)} dx$

let $u = x-1$

$\frac{du}{dx} = 1$

Cont'd (1)

$dx = \frac{du}{1}$	$dx = \frac{du}{1}$
$= \int \frac{-5}{u} \cdot \frac{du}{1}$	$= \int \frac{2}{u} \cdot \frac{du}{1}$
$= \frac{-5}{1} \int \frac{du}{u}$	$= \frac{2}{1} \int \frac{du}{u}$
$= -5 \int \frac{1}{u} \cdot du$	$= 2 \int \frac{1}{u} \cdot du$
$= -5 \ln u$	$= 2 \ln u$
$= -5 \ln (x+3$	$= 2 \ln (x-1)$

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

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

Sol^n

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

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

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

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

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

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

$\Rightarrow -24 = -6A$

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

$A = 4$

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

$\Rightarrow -45 = 15B$

$B = -3$

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

$\Rightarrow 10 = 10C$

$\Rightarrow C = 1$

cont'd (2)

$\int \frac{-1}{u} \cdot \frac{du}{1}$

$-1 \int \frac{du}{u}$

$-1 \int \frac{1}{u} \cdot du$

$= -1 \ln u$

$= -1 \ln(x-3)$

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

$= 5 \int \frac{du}{u}$

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

$= 5 \ln u$

$= 5 \ln(x+1)$

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

② $\int \frac{4x-16}{(x^2-2x-3)}$

$$\frac{4x-16}{(x-3)(x+1)} = \frac{A}{(x-3)} + \frac{B}{(x+1)} \quad (2)$$

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

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

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

$$-4 = 4A$$

$$A = -1$$

$$F(-1) \Rightarrow 4(-1)-16 = B(-1-3)$$

$$-20 = -4B$$

$$B = 5$$

~~Put A and B into ①~~

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

$$\int \frac{-1}{(x-3)} dx \qquad \int \frac{5}{(x+1)} dx$$

let $u = x-3$	let $u = x+1$
$\frac{du}{dx} = 1$	$\frac{du}{dx} = 1$
$dx = \frac{du}{1}$	$dx = \frac{du}{1}$

~~ex~~ Cont'd ③

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

$\Rightarrow \int \frac{4}{(x+1)}dx$

let $u = x+1$

$\frac{du}{dx} = 1$

$dx = \frac{du}{1}$

$\int \frac{4}{u} \cdot \frac{du}{1}$

$4\int \frac{1}{u} \cdot du$

$4 \ln u$

$= 4\ln(x+1)$

$\int \frac{-3}{(x-2)}dx$

let $u = x-2$

$\frac{du}{dx} = 1$

$dx = \frac{du}{1}$

$\int \frac{-3}{u} \cdot \frac{du}{1}$

$-3\int \frac{1}{u} \cdot du$

$-3 \ln u$

$= -3\ln(x-2)$

$\int \frac{1}{(x+3)}dx$

let $u = x+3$

$\frac{du}{dx} = 1$

$dx = \frac{du}{1}$

$\int \frac{1}{u} \cdot \frac{du}{1}$

$1\int \frac{1}{u} \cdot du$

$1 \ln u$

$= \ln(x+3)$

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