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 M/IMS01/363  
 MATHS 104  
 1865

$$① \frac{11-3x}{x^2+2x-3} = \frac{11-3x}{(x-1)(x+3)} = \frac{A}{x-1} + \frac{B}{x+3}$$

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

f(1)

$$11-3(1) = A(4) + B(0)$$

$$8 = 4A$$

$$A = 2$$

f(-3)

$$11-3(-3) = A(0) + B(-3-1)$$

$$11+9 = -4B$$

$$20 = -4B$$

$$B = -5$$

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

$$\therefore \text{let } u = (x-1)$$

$$v = (x+3)$$

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

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

$$\int \frac{2}{u} du = 2 \int \frac{1}{u} du$$

$$\therefore du = dx$$

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

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

$$-5 \int \frac{1}{u} du$$

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

$$\therefore 2 \ln (x-1) - 5 \ln (x+3)$$

=

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

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

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

f(-1)

$$\therefore 4(-1)-16 = A(-4) + B(0)$$

$$-4-16 = -4A$$

$$-20 = -4A$$

$$A = 5$$

f(3)

$$f(3), 4(3)-16 = A(0) + B(4)$$

$$12-16 = 4B$$

$$-4 = 4B$$

$$B = -1$$

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

$$\text{let } u = x+1$$

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

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

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

$$5 \ln u = 5 \ln (x+1)$$

$$\text{let } u = x-3$$

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

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

$$-\ln u$$

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

$$\therefore 5 \ln (x+1) - \ln (x-3)$$

=

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

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

for  $f(2)$

$$2(2)^2 - 9(2) - 35 = A(0)(5) + B(3)(5) + C(3)(0)$$

$$-45 = 15B$$

$$B = -45/15$$

$$B = -3$$

for  $f(-1)$

$$2(-1)^2 - 9(-1) - 35 = A(-2)(2) + B(0)(2) + C(0)(-3)$$

$$2 + 9 - 35 = -6A$$

$$-24 = -6A \quad -2A = -4A$$

$$A = 4$$

for  $f(-3)$

$$2(-3)^2 - 9(-3) - 35 = A(-3-2)(0) + B(-3+1)(0) + C(-2)(-5)$$

$$2(9) + 27 - 35 = 10C$$

$$10 = 10C$$

$$C = 1$$

$$A = 4, B = -3, C = 1$$

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

$$= \int \frac{4}{x+1} dx + \int \frac{-3}{x-2} dx + \int \frac{1}{x+3} dx$$

$$\text{let } u = x+1$$

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

$$du = dx$$

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

$$4 \ln u$$

$$4 \ln(x+1)$$

$$\text{let } u = x-2$$

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

$$du = dx$$

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

$$-3 \ln u$$

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

$$\text{let } u = x+3$$

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

$$du = dx$$

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

$$\ln u$$

$$\ln(x+3)$$

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

