NAME: ALLOR STEPHEN NONSO
MATRIC: 19/MHS01/087 MHS

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

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

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

Divide both sides by $(x-1)(x+3)$

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

$\therefore$ $A+B=3$

$3A-B=11$

TO Find B

$A = 3-B$

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

$-9-3B-B=11$

$-4B = 20$

$B = -5_{11}$

TO Find A

$B = -3-A$

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

$3A+3+A=11$

$4A = 11-4$

$4A = 8$

$A = \frac{8}{4}$

$A = 2_{11}$

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

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

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

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

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

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

Let $x = -1$

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

$$-4-16 = 0 - 4B$$

$$+20 = +4B$$

$$B = \frac{20}{4}$$

$$B = 5_{11}$$

Let $x = +3$

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

$4A + 0 = -4$

$A = -1$

$$\therefore \int \frac{4x-16}{x^2-2x-3}\,dx = \int \frac{A}{(x-3)} + \int \frac{B}{(x+1)}$$

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

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

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

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

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

$2x^2-9x-35 = A(x^2+x-6) + B(x^2+4x+3) + C(x^2-x-2)$

$2x^2-9x-35 = Ax^2+Ax-6A+Bx^2+4Bx+3B+Cx^2-Cx-2C$

$2x^2-9x-35 = x^2(A+B+C) + x(A+4B+C) - 6A + 3B - 2C$

Hence

$A+B+C=2$ --(i)

$A+4B+C=-9$ --(ii)

$-6A+3B-2C=-35$ --(iii)

$A=2-B-C$ --(iv)

$2-B-C+4B-C=-9$

$2C+3B=-11$ --(v)

Substituting (iv) into (iii)

$-6(2-B-C)+3B-2C=-35$

$-12+6B+6C+3B-2C=-35$

$4C+9B=-23$ --(vi)

Using elimination method

$-2C+3B=-11$

$4C+9B=-23$

$-6C+9B=-33$

$4C+9B=-23$

$-10C=-16$

$C=1\frac{1}{5}$