

$$Q2: \int \frac{5x+8}{(x+3)(2x-1)} dx$$

$$\int \frac{5x+8}{(x+3)(2x-1)} = \frac{A}{x+3} + \frac{B}{2x-1}$$

$$5x+8 = A(2x-1) + B(x+3)$$

put  $x = -3$   $x+3=0$   
 $x = -3$

$$-15+8 = A(-6-1) + B(-3+3)$$

$$-7 = -7A \Rightarrow \boxed{A=1}$$

and

put  $x = \frac{1}{2}$   $2x-1=0$   
 $2x=1$   
 $x=1/2$

$$\frac{5}{2} + 8 = A\left(2\left(\frac{1}{2}\right) - 1\right) + B\left(\frac{1}{2} + 3\right)$$

$$5+16 = A(0) + B\left(\frac{1+6}{2}\right)$$

$$\frac{21}{2} \times \frac{2}{7} = B\left(\frac{7}{2}\right) \times \frac{2}{7} \Rightarrow \boxed{B=3}$$

$$\int \frac{5x+8}{(x+3)(2x-1)} dx = \int \left( \frac{1}{x+3} + \frac{3}{2x-1} \right) dx$$

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

$$= \ln|x+3| + \frac{3}{2} \ln|2x-1| + C$$

$$Q3: \int \frac{2x-1}{x(x-1)(x-3)} dx \rightarrow -\frac{1}{3} \ln|x| - \frac{1}{2} \ln|x-1| + \frac{5}{6} \ln|x-3|$$

$$Q4: \int \frac{3x^2-12x+11}{(x-1)(x-2)(x-3)} dx, \ln|x-1| + \ln|x-2| + \ln|x-3| + C$$