7-4 Partial fractions

8. $\int \frac{3t-2}{t+1}\,dt = \int \left(\frac{3(t+1)}{t+1} - \frac{5}{t+1}\right) dt$

$= \int 3 - \frac{5}{t+1}\,dt$

$= 3\int 1\,dt - 5\int \frac{1}{t+1}\,dt$

$= 3t - 5\ln(t+1) + C$

a. $\int \frac{5x+1}{(2x+1)(x-1)}\,dx = \int \frac{5(x-1)}{(2x+1)(x-1)} + \frac{10}{(2x+1)(x-1)}$

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

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

$3B = 6$

$-\frac{3}{2}A = -\frac{3}{2}$

$A = 1$

$B = 2$

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

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

$= \frac{1}{2}\ln(2x+1) + 2\ln(x-1) + C$

11. $\int \frac{2}{2x^2+3x+1} = 2 \cdot \int \left(\frac{A}{2x+1} + \frac{B}{x+1}\right)$

$\frac{A}{2x+1} + \frac{B}{x+1} = \frac{1}{2x^2+3x+1}$

$A(x+1) + B(2x+1) = 1$

$B = 1$

$A = 2$

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

$2\left(\ln(2x+1) - \ln(x+1)\right) + C$

20. $\frac{x^2-5x+16}{(2x+1)(x-2)^2} = \frac{A}{2x+1} + \frac{B}{x-2} + \frac{C}{(x-2)^2}$

$A(x-2)^2 + B(2x+1)(x-2) + C(2x+1)$

$A = 3$

$B = -1$

$C = 2$

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

$\frac{3}{2}\left(\ln(2x+1)\right) - \ln(x-2) + -\frac{2}{x-2}$

26. $\int \frac{x^2+x+1}{(x^2+1)^2} = \frac{A}{x^2+1} + \frac{B}{(x^2+1)^2}$

Help!

Why is it $A(x^2+1) + B = x^2+x+1$

$\frac{Ax+B}{x^2+1} + \frac{Cx+D}{(x^2+1)^2}$ and not the regular A tr

$\therefore$