

$$\frac{3x+2}{(x-1)(x^2+1)} \equiv \frac{A}{x-1} + \frac{Bx+C}{x^2+1}$$

$$\equiv \frac{A(x^2+1) + (Bx+C)(x-1)}{(x-1)(x^2+1)}$$

$$\therefore 3x+2 \equiv A(x^2+1) + (Bx+C)(x-1)$$

$$\equiv Ax^2 + A + Bx^2 + Cx - Bx - C \quad *$$

putting $x = 1$

$$3+2 = A(1+1) + 0$$

$$5 = 2A, \quad \underline{A = \frac{5}{2}}$$

putting $x = 0$

$$2 = A + (C)(-1)$$

$$2 = A - C$$

$$2 = \frac{5}{2} - C, \quad C = \frac{5}{2} - 2, \quad \underline{C = \frac{1}{2}}$$

from * equating coefficients of x^2

$$0 = A + B$$

$$0 = \frac{5}{2} + B, \quad \therefore \underline{B = -\frac{5}{2}}$$

$$\frac{3x+2}{(x-1)(x^2+1)} \equiv \frac{5}{2(x-1)} + \frac{\left(-\frac{5}{2}x + \frac{1}{2}\right)}{(x^2+1)}$$

$$\frac{3x+2}{(x-1)(x^2+1)} \equiv \frac{5}{2(x-1)} + \frac{(-5x+1)}{2(x^2+1)}$$

$$\frac{3x+2}{(x-1)(x^2+1)} \equiv \frac{5}{2(x-1)} + \frac{(1-5x)}{2(x^2+1)}$$
