

$$22. \frac{x^2 + 6x + 4}{x^4 + 8x^2 + 16} = \frac{x^2 + 6x + 4}{(x^2 + 4)^2} = \frac{Ax + B}{x^2 + 4} + \frac{Cx + D}{(x^2 + 4)^2}$$

$$\begin{aligned} x^2 + 6x + 4 &= (Ax + B)(x^2 + 4) + Cx + D \\ &= Ax^3 + Bx^2 + (4A + C)x + 4B + D \end{aligned}$$

By equating coefficients of like terms, you have

$$A = 0, \quad B = 1, \quad 4A + C = 6, \quad 4B + D = 4.$$

Solving these equations you have  $A = 0, B = 1, C = 6, D = 0$ .

$$\begin{aligned} \int \frac{x^2 + 6x + 4}{x^4 + 8x^2 + 16} dx &= \int \frac{1}{x^2 + 4} dx + \int \frac{6x}{(x^2 + 4)^2} dx \\ &= \frac{1}{2} \arctan \frac{x}{2} - \frac{3}{x^2 + 4} + C \end{aligned}$$