B4. $\int \frac{x^2+4}{(x+2)^2}\,dx = \int \frac{x^2+4}{x^2+4x+4}\,dx$

x^2+4 | x^2+4x+4

$-x^2-4x-4$ | 1

$-4x$

$$I = \int \left(1 - \frac{4x}{(x+2)^2}\right) dx.$$

$$\frac{4x}{(x+2)^2} = \frac{A}{x+2} + \frac{B}{(x+2)^2}$$

$$\frac{4x}{(x+2)^2} = \frac{A(x+2)+B}{(x+2)^2}$$

$$4x = A(x+2) + B.$$

$x=-2 \quad \boxed{-8 = B}$

$x=0 \quad 0 = 2A - 8 \longrightarrow \boxed{A = 4}$

$$I = \int \left[1 - \left(\frac{4}{x+2} - \frac{8}{(x+2)^2}\right)\right] dx =$$

$8\cdot(x+2)^{-2}$

$$= \int \left(1 - \frac{4}{x+2} + \frac{8}{(x+2)^2}\right) dx =$$

$$= x - 4\ln|x+2| + 8\frac{(x+2)^{-2+1}}{-2+1} + k =$$

$$\boxed{I = x - 4\ln|x+2| - \frac{8}{x+2} + k.}$$

B4 II/ $\int (x+2)\sin(3x)\,dx$

Zatikoko metodoojot:

$$\int u(x)\,dv = u(x)\cdot v(x) - \int v(x)\,du.$$

$$\begin{cases} u = x+2 \longrightarrow du = dx \\ dv = \sin 3x\,dx \longrightarrow v = \frac{1}{-3}\int -3\sin 3x\,dx. \end{cases}$$

$$v = -\frac{1}{3}\cos(3x)$$

$\cos 3x \longrightarrow -3\sin 3x$

$$I = (x+2)\left(-\frac{1}{3}\right)\cos 3x - \int -\frac{1}{3}\cos(3x)\cdot dx =$$

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

$\sin 3x \longrightarrow 3\cos(3x)$

$$\boxed{I = \frac{-x-2}{3}\cdot\cos(3x) + \frac{\sin(3x)}{9} + K.}$$