

①. $\int \frac{2}{3} x^3 dx$

④ $\int (x^2-1) \cos x dx$

② $\int x^2 \sqrt{3+5x^2} dx$

⑤ $\int \frac{x+2}{x^2-6x+8} dx$

③ $\int \frac{x^2-2x+1}{(x^3-3x^2+3x)^4} dx$

⑥ $\int \frac{x^3-2x+1}{x^2+x-2} dx$

jawab:

①. $\int \frac{2}{3} x^3 dx = \frac{\frac{2}{3} x^{3+1}}{3+1} + C$

$= \frac{\frac{2}{3} x^4}{4} + C$

$= \frac{2}{12} x^4 + C$

$= \frac{1}{6} x^4 + C$
=.

②

$$\textcircled{3} \int \frac{x^2 - 2x + 1}{(x^3 - 3x^2 + 3x)^4} dx = \int \frac{x^2 - 2x + 1}{(u)^4} \cdot \frac{du}{3x^2 - 6x + 3}$$

$$\textcircled{a) u = x^3 - 3x^2 + 3x} \quad = \int \frac{\cancel{x^2 - 2x + 1}}{u^4} \cdot \frac{du}{3\cancel{x^2 - 2x + 1}}$$

$$du = 3x^2 - 6x + 3 \quad dx$$

$$dx = \frac{du}{3x^2 - 6x + 3}$$

$$= \int \frac{1}{u^4} \cdot \frac{du}{3}$$

$$= \frac{1}{3} \int \frac{1}{u^4} \cdot du$$

$$= \frac{1}{3} \int u^{-4} \cdot du$$

$$= \frac{1}{3} \cdot \frac{1}{-3} u^{-3} + C$$

$$= \frac{1}{-9} \cdot \frac{1}{u^3} + C$$

$$= \frac{1}{-9} \cdot \frac{1}{(x^3 - 3x^2 + 3x)^3} + C$$

$$\begin{aligned} \textcircled{4} \int (x^2 - 1) \cos x \, dx &= \int x^2 (\cos(x)) - \cos(x) \, dx \\ &= \int x^2 (\cos(x)) \, dx - \int \cos(x) \, dx \\ &= x^2 \sin(x) + 2x \cos(x) - 2 \sin(x) - \sin(x) \\ &= x^2 \sin(x) + 2x \cos(x) - 3 \sin(x) \end{aligned}$$

$$\textcircled{5} \int \frac{x+2}{x^2-6x+8} dx \quad \left| \quad \frac{x+2}{x^2-6x+8} = \frac{A}{(x-4)} + \frac{B}{(x-2)} \right.$$

$$\Rightarrow \frac{x+2}{x^2-6x+8} = \frac{A(x-2) + B(x-4)}{(x-4)(x-2)}$$

$$\# (x-2)=0$$

$$x=2$$

$$2+2 = A(0) + B(-2)$$

$$4 = -2B$$

$$\boxed{-2=B}$$

$$\# (x-4)=0$$

$$x=4$$

$$4+2 = A(4-2) + B(0)$$

$$6 = 2A$$

$$\boxed{3=A}$$

$$= \frac{3}{x-4} + \left(\frac{-2}{x-2} \right)$$

$$= \int \frac{x+2}{x^2-6x+8} dx = \int \frac{3}{x-4} dx + \int \frac{-2}{x-2} dx$$

$$= 3 \ln(x-4) - 2 \ln(x-2) + C$$

$$\textcircled{6} \quad x^2+x-2 \overline{) \begin{array}{r} x-1 \\ x^3-2x+1 \\ x^3+x^2-2x \\ \hline -x^2+1 \\ -x^2-x+2 \\ \hline x-1 \end{array}}$$

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

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

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

$$o) (x-1) = 0$$

$$x=1$$

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

$$0 = A(0) + B(3)$$

$$0 = 3B$$

$$\boxed{0=B}$$

$$i) x+2=0$$

$$x=-2$$

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

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

$$\boxed{1=A}$$

$$\begin{aligned} \int \frac{x^3 - 2x + 1}{x^2 + x - 2} dx &= \int (x-1) dx + \int \frac{1}{x+2} dx \\ &= \int x dx - \int 1 dx + \int \frac{1}{x+2} dx \\ &= \frac{x^2}{2} - \int 1 dx + \int \frac{1}{x+2} dx \\ &= \frac{x^2}{2} - x + \ln(x+2) + C \end{aligned}$$