

$$③ \int e^{2\theta} \cos 3\theta d\theta$$

$$u = \cos 3\theta$$

$$du = -\sin 3\theta$$

$$-3 \sin 3\theta$$

$$dv = e^{2\theta}$$

$$v = \frac{e^{2\theta}}{2}$$

$$\cos 3\theta \cdot \frac{e^{2\theta}}{2} - \int \frac{e^{2\theta}}{2} \cdot (-3 \sin 3\theta) d\theta$$

$$\frac{\cos 3\theta (e^{2\theta}) - \frac{e^{2\theta}}{3} \cos 3\theta}{3} + C$$

$$④ \int \sqrt{5+4x-x^2} dx$$

$$-(x^2 - 4x - 5)$$

$$b = -4$$

$$\left(x + \frac{b}{2}\right)^2$$

$$\left(x - \frac{4}{2}\right)^2$$

$$(x+2)(x+2)$$

$$x^2 + 2x + 2x + 4$$

$$x^2 + 4x + 4 - 9$$

$$x^2 + 4x - 5$$

$$(x+2)^2 - 4 - 5 = -5$$

$$\int 5 + 4x - x^2 dx = \int x^2 + 4x - 5$$

$$= 5 \int \frac{x^3}{3} + \frac{4x^2}{2}$$

$$= \frac{5x^3}{3} + 2x^2 + C$$

$$\textcircled{6} \int_0^{\pi/4} x \sec^2 x \, dx$$

$$u = x$$

$$du = 1$$

$$dv = \sec^2 x$$

$$v = \tan x$$

$$x \tan x - \int \tan x \, dx$$

$$x \tan x + \ln |\cos x| + C$$

$$x \tan x + \ln |\cos x|$$

$$\Rightarrow 0 \tan 0 + \ln |\cos 0| - \left(\frac{\pi}{4} \tan \frac{\pi}{4} + \ln \left| \cos \frac{\pi}{4} \right| \right) =$$

$$= -1.61319$$

✓

$$\textcircled{5} \int_0^3 \frac{x}{\sqrt{36-x^2}} dx$$

$$= \int \frac{6 \cancel{\sin \theta}}{6 \cancel{\cos \theta}} 6 \cancel{\cos \theta} d\theta$$

$$= \int 6 \sin \theta d\theta$$

$$x = 6 \sin \theta$$

$$\frac{dx}{\sqrt{36-x^2}} = 6 \cos \theta$$

$$6 \cancel{\sin \theta} d\theta$$

$$6 (-\cos \theta) = -6 \cos \theta$$

$$= \frac{-6 \sqrt{36-x^2}}{6} = -\sqrt{36-x^2}$$

$$-\sqrt{36-(3)^2} - (-\sqrt{36-(0)^2}) = -\sqrt{36-9} = \sqrt{27}$$