

$$[1] F(x) = \frac{x^5}{5} + \frac{19}{5}$$

[2]

$$(1) \int x^2 \log x \, dx = \frac{x^3}{3} \log x - \frac{1}{9} x^3 + C$$

$$(2) \int \frac{x^3}{\sqrt{1-x}} \, dx = \frac{2}{7} (1-x)^{7/2} - \frac{6}{5} (1-x)^{5/2} + 2(1-x)^{3/2} - 2(1-x)^{1/2} + C$$

$$(3) \int \frac{1}{x^2 + 4x - 1} \, dx = \frac{1}{2\sqrt{5}} \log \left| \frac{x+2-\sqrt{5}}{x+2+\sqrt{5}} \right| + C$$

$$(4) \int \frac{-5x-1}{(x^2+1)(x-5)} \, dx = \log \frac{\sqrt{x^2+1}}{|x-5|} + C$$

[3] 次の定積分を計算せよ .

$$(1) \int_1^2 \left( \frac{\sqrt{x}}{2} - \frac{1}{\sqrt[3]{x}} \right) dx = \frac{2\sqrt{2}}{3} - \frac{3\sqrt[3]{4}}{2} + \frac{7}{6}$$

$$(2) \int_0^{\frac{\pi}{2}} x \sin x \, dx = 1$$

$$(3) \int_0^{\frac{\pi}{6}} \cos \left( \frac{\pi}{3} - 3x \right) dx = \frac{1+\sqrt{3}}{6}$$

$$(4) \int_0^2 x e^{-x^2} \, dx = \frac{1}{2} (1 - e^{-4})$$

[4] 次の広義積分を計算せよ .

$$(1) \int_1^{\infty} \frac{1}{x^7} \, dx = \frac{1}{6}$$

$$(2) \int_0^1 \frac{1}{\sqrt{1-x}} \, dx = 2$$

$$(3) \int_{-\infty}^{\infty} \frac{1}{5+x^2} \, dx = \frac{\pi}{\sqrt{5}}$$

$$(4) \int_0^{\infty} x^2 e^{-x} \, dx = 2$$