

9) 部分分数分解を用いて、次の不定積分を求めよ。

(1) $\int \frac{5x-2}{x(x-1)} dx$ (2) $\int \frac{2}{(x+1)(x^2+1)} dx$

(1) 1) 部分分数分解 $\frac{5x-2}{x(x-1)} = \frac{p}{x} + \frac{q}{x-1}$

2) 不定積分 $\int \frac{5x-2}{x(x-1)} dx =$

(2) 1) 部分分数分解 $\frac{2}{(x+1)(x^2+1)} = \frac{p}{x+1} + \frac{qx+r}{x^2+1}$

2) 不定積分 $\int \frac{2}{(x+1)(x^2+1)} dx =$

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

(2) $\int \frac{2}{(x+1)(x^2+1)} dx = \int \left(\frac{1}{x+1} + \frac{-x+1}{x^2+1} \right) dx$
 $= \int \frac{1}{x+1} dx - \frac{1}{2} \int \frac{2x}{x^2+1} dx + \int \frac{1}{x^2+1} dx = \log \frac{|x+1|}{\sqrt{x^2+1}} + \text{Tan}^{-1} x + C$