



NOTE #5 (TRIGONOMETRIC SUBSTITUTION, INTEGRATION OF RATIONAL
FUNCTIONS BY PARTIAL FRACTIONS, IMPROPER INTEGRALS)

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[Trigonometric Substitution]

(1) Evaluate $\int \frac{x^2}{\sqrt{16-x^2}} dx$.



(2) Evaluate $\int_0^5 \frac{1}{\sqrt{25+x^2}} dx$.



(3) Evaluate $\int \frac{1}{t^2 \sqrt{4t^2 - 9}} dt$.



(4) Evaluate $\int \frac{1}{(t^2 + 6t + 13)^{3/2}} dt$.



[Integration of Rational Functions by Partial Fractions]

- (5) Write the form of the partial fraction decomposition of the function.

$$\frac{5x^3 - 3x}{(2x - 3)^2(x^5 + 4x^3)}$$

- (6) Evaluate $\int \frac{2x^2 - 11x + 25}{(x - 3)(3x^2 - 13x + 12)} dx$.



(7) Evaluate $\int \frac{2x^3 - 4x^2 - 2}{x^2 - 4x} dx$.



(8) Evaluate $\int \frac{2x - 5}{(2x - 3)(x^2 + 2)} dx$.



[Improper Integrals]

(9) Evaluate $\int_3^{\infty} \frac{1}{x^2 + 3x - 10} dx$.



(10) Evaluate $\int_4^{\infty} \frac{e^{-\sqrt{x}}}{\sqrt{x}} dx$.



(11) Evaluate $\int_1^{\infty} 3xe^{-2x} dx$.