

Integral Calculus (M-106), S. 5

Exercise 1:

Find $f'(x)$ if $f(x)$ is the given expression.

- | | | |
|----------------------------------|--------------------------------|--------------------------------------|
| 1) $\sec^{-1} \sqrt{x^2 - 1}$ | 2) $\frac{1}{\sin^{-1} x}$ | 3) $\cos^{-1}(\cos e^{2x})$ |
| 4) $\frac{e^{2x}}{\sin^{-1} 2x}$ | 5) $\frac{\arctan x}{x^2 + 1}$ | 6) $x \arccos \sqrt{4x + 1}$ |
| 7) $3^{\arcsin(x^3)}$ | 8) $(x \tan x)^{\arctan x}$ | 9) $(\tan^{-1}(4x))e^{\tan^{-1} 4x}$ |

Exercise 2:

a) Find $y'(x)$.

- 1) $x^2 + x \sin^{-1} y(x) = y(x)e^x$ 2) $\ln(x + y(x)) = \tan^{-1}(xy(x))$

b) Evaluate the intergral

- | | | |
|--|--|---|
| 1) $\int \frac{\sin x}{\cos^2 x + 1} dx$ | 2) $\int \frac{\cos x}{\sqrt{9 - \sin^2 x}} dx$ | 3) $\int \frac{\sin x}{\cos^2 x + 1} dx$ |
| 4) $\int \frac{1}{x\sqrt{x^6 - 4}} dx$ | 5) $\int \frac{1}{\sqrt{x}(1+x)} dx$ | 6) $\int \frac{\sec x \tan x}{1 + \sec^2 x} dx$ |
| 7) $\int \frac{e^x}{\sqrt{4 - e^x}} dx$ | 8) $\int \frac{\cos x}{\sin x \sqrt{\sin^2 x - 1}} dx$ | $\int_2^2 \frac{1}{x\sqrt{x^2 - 1}} dx$ |
| | | $\frac{2}{\sqrt{3}}$ |

Exercise 3:

Find $f'(x)$ if $f(x)$ is the given expression.

$$\begin{array}{lll} 1) \sqrt{\cosh^{-1} x} & 2) \tanh^{-1}(\sin 3x) & 3) \operatorname{sech}^{-1} \sqrt{1-x} \\ 4) \ln \cosh^{-1}(4x) & 5) (\operatorname{sech}^{-1} x)^{-1} & 6) \cosh^{-1} \ln 4x \\ 7) e^{4x} \sec^{-1} e^{4x} & 8) \frac{1}{x} \tanh \frac{1}{x} & 9) \cosh^{-1} \tan x \end{array}$$

Exercise 4:

Evaluate the integral

$$\begin{array}{lll} 1) \int \frac{1}{\sqrt{81+16x^2}} dx & 2) \int \frac{1}{\sqrt{16x^2-9}} dx & 3) \int \frac{1}{49-4x^2} dx \\ 4) \int \frac{e^x}{\sqrt{e^{2x}-16}} dx & 5) \int \frac{\sin x}{\sqrt{1+\cos^2 x}} dx & 6) \int \frac{2}{5-3x^2} dx \\ 7) \int \frac{x}{\operatorname{sech}(x^2)} dx & 8) \int \frac{\sinh(\ln x)}{x} dx & 9) \int \operatorname{sech}^2(1-2x) dx \\ 10) \int \frac{x}{\sqrt{25x^2+36}} dx & 11) \int \frac{1}{\sqrt{25x^2+36}} dx & 12) \frac{\ln \sinh x}{x} \end{array}$$