King Saud University
Department of Mathematics
College of Sciences

Second Semester 2012/13

Integral Calculus (M-106), Serie N: 4

Exercise 1:

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

$$1)x\ln x \qquad 2)\frac{1}{\ln x}+\ln\frac{1}{x} \qquad 3)\ln|5x^2-1|^3$$
$$4)\cos(\ln 2x) \quad 5)\ \ln|\csc x-\cot x| \qquad 6)\ln\frac{\sqrt{x^2+1}}{(9x-4)^2}$$

Exercise 2:

a) Use implicit differentiation to find $y'(x)$.

$$1)\ \ x\ln y(x)-y(x)\ln x=0 \quad 2)\ \ y^3(x)+x^2\ln y(x)=5x+3$$

b) Use logarithmic differentiation to find $\dfrac{dy(x)}{dx}$.

$$1)y(x)=\sqrt{4x+7}(x-5)^3 \quad 2)y(x)=\frac{(x^2+3)^5}{\sqrt{x+1}}$$

Exercise 3:

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

$$1)\ \frac{x}{e^{x^2}} \qquad 2)e^{\sqrt{x}}+\sqrt{e^x} \qquad 3)e^{\sin 5x}$$
$$4)e^{-3x}\cos 3x \quad 5)\frac{e^x-e^{-x}}{e^x+e^{-x}} \qquad 6)e^{-x}\tan^2 x$$

b) Use implicit differentiation to find $y'(x)$.

$$1)\ \ e^x\cos y=xe^y \quad 2)\ xe^y+2x-\ln(y+1)=3$$

Exercise 4:

Evaluate the integral.

1)

$$a)\int \frac{1}{4-5x}dx \quad b)\int_{-1}^{0} \frac{1}{4-5x}dx$$

2)

$$a)\int \frac{3x}{x^2+4}dx \quad b)\int_{1}^{2} \frac{3x}{x^2+4}dx$$

3)

$$a)\int x^2 e^{3x^3}dx \quad b)\int_{1}^{2} x^2 e^{3x^3}dx$$

4)

$$a) \int (\csc x - 1)^2 dx \quad b) \int e^{2x}\sec e^{2x}dx \quad c)\int \frac{\cot \sqrt[3]{x}}{\sqrt[3]{x^2}}dx$$

Exercise 5:

Solve the differential equation subject to the given conditions.

1)

$$y^{'}(x) = 4e^{2x} + 3e^{-2x};\ y = 4 \text{ if } x = 0$$

2)

$$y^{'}(x) = 3e^{4x} - 8e^{-2x}; y = -2 \text{ if } x = 0$$

Exercise 6:

Find $f^{'}(x)$ if $f(x)$ is given expression.

$$1)(\cos 2x)^{2x} \quad 2)(10^x + 10^{-x})^{10} \quad 3)\log_5 \left|\frac{1-x^2}{2-5x^3}\right|$$

$$4)(x\pi)^x \quad 5)(\log_2 |x|\,\pi)^x \quad 6)x^{\tan x}$$

Exercise 7:

Evaluate the intergal.

1)

$$a)\int 2^{3x-1}dx \qquad aa)\int_{-1}^{1} 2^{3x-1}dx$$

$$b)\int 6^{-6x}dx \qquad bb)\int_{1}^{2} 6^{-6x}dx$$

2)

$$a)\int x3^{-x^2}dx \qquad b)\int \frac{(2^x+1)^2}{2^x}dx$$

$$c)\int \frac{2^x}{2^x+1}dx \qquad d)\int 3^{\cos x}\sin x dx$$

$$e)\int e^{\pi}dx \qquad f)\int \frac{10^{\sqrt{x}}}{\sqrt{x}}dx$$