WORKSHEET # IX

1. Find dy/dx.

a) $y = \cos(e^{-x^2})$

b) $y = \left(1 + \dfrac{1}{x}\right)^x$

c) $y = (\ln x)^{\ln x}$

d) $y = 2^x \log_3(x^2 + 1)$

e) $y = \ln\left(\dfrac{\sqrt{\sin x \cos x}}{1 + 2\ln x}\right)$

f) $y = \sqrt[5]{\dfrac{(x^2 + 1)(x + 3)^{1/2}}{x - 1}}$

g) $y = \displaystyle\int_0^{\ln x} \sin e^t \; dt$

h) $y = \displaystyle\int_{e^{4\sqrt{x}}}^{e^{2x}} \ln t \; dt$

i) $\ln y = e^y \sin x$

j) $\ln(xy) = e^{x+y}$

k) $e^{2x} = \sin(x + 3y)$

l) $y = \dfrac{\ln x}{1 + \ln x}$

m) $y = x^3(\sin^{-1} x)^2$

n) $\tan y = e^x + \ln x$

o) $y = \sinh^{-1}\dfrac{1}{1 - x}$

p) $y = e^{\sinh x} + \tan^{-1}(\cosh x)$

q) $y = \arccos(e^{3x-2})$

r) $y = \ln(x^2 + 4) - x\tan^{-1}\left(\dfrac{x}{2}\right)$

2. Find the area of the regions enclosed by the following curves.

(a) $y = e^x, \; y = -e^{-x}, \; x = -1, \; x = 1$

(b) $y = e^x, \; y = \ln x, \; x = 1, \; x = 2$

(c) $y = \tan x, \; x = \dfrac{-\pi}{4}, \; x = \dfrac{\pi}{3}$

3. Evaluate following integrals.

(a) $\displaystyle\int_0^{\pi/3} \dfrac{4\sin\theta}{1 - 4\cos\theta} \, d\theta$

(b) $\displaystyle\int \dfrac{\sec x}{\sqrt{\ln(\sec x + \tan x)}} \, dx$

(c) $\displaystyle\int_0^{\pi/4} (1 + e^{\tan\theta})\sec^2\theta \, d\theta$

(d) $\displaystyle\int \dfrac{\cot x \, dx}{\sqrt{\ln(\sin x)}}$

(e) $\displaystyle\int \dfrac{e^x \, dx}{\sqrt{1 + e^{2x}}}$

(f) $\displaystyle\int \dfrac{1}{1 + e^x} \, dx$

(g) $\displaystyle\int \dfrac{1}{16x^2 + 9} \, dx$

(h) $\displaystyle\int \dfrac{e^{\sin^{-1} x} \, dx}{\sqrt{1 - x^2}}$

(i) $\displaystyle\int \dfrac{\cos^2 x}{1 + \sin(2x)} \, dx$

(j) $\displaystyle\int \dfrac{1}{\sin x - \cos x} \, dx$

(k) $\displaystyle\int \dfrac{\sqrt{1 - x^2} + \sqrt{1 + x^2}}{\sqrt{1 - x^4}} \, dx$

(l) $\displaystyle\int \dfrac{1}{x\sqrt{\ln^2 x - 1}} \, dx$

(m) $\displaystyle\int \dfrac{1}{(2x + 1)\sqrt{4x^2 + 4x - 8}} \, dx$

(n) $\displaystyle\int \dfrac{1 + \cosh 2x}{\sinh^2 2x} \, dx$

(o) $\displaystyle\int \dfrac{\cos 2x}{\sqrt{1 + \sin^2 2x}} \, dx$

(p) $\displaystyle\int \dfrac{\cosh\theta \, d\theta}{\sinh\theta + \cosh\theta}$

(q) $\displaystyle\int \dfrac{\tan x \, dx}{\sqrt{1 + \cos^2 x}}$

(r) $\displaystyle\int \dfrac{dx}{1 + \cosh^2 x}$

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