International Indian School, Riyadh

Worksheet on chapter 5 and 6

Class 12 Subject: Mathematics

1) Differentiate: $\cos x^3 . \sin^2 x^5$ w.r.t.x
2) Find: $\frac{dy}{dx}$ if $ax^2+2hxy+by^2=0$
3) Find: $\frac{dy}{dx}$ if $y= \tan^{-1}\left(\frac{3x-(x)3}{1-3x}{}_2\right)$
4) Differentiate: $\frac{\sqrt{[(x-3)x^2+4)}}{\sqrt{3x^2+4x+5}}$ w.r.t.x
5) Find: $\frac{dy}{dx}$ if $y^x+x^y+x^x=a^b$
6) Differentiate: $x^{\cos x}+ (\cos x)^{\sin x}$ w.r.t.x
7) If $x=\sqrt{a^{sin^{-1}}}t$; $y=\sqrt{a^{cos^{-1}}}t$ show that $\frac{dy}{dx}=\frac{-y}{x}$
8) If $x=\cos\theta- \cos 2\theta$; $y= \sin\theta- \sin 2\theta$ find $\frac{dy}{dx}$
9) If $y= 3\cos(10gx)+ 4\sin(10gx)$ show that $x^2y_2+ xy_1+y=0$
10) If $y= (\tan^{-1}x)^2$ show that $(x^2+1)^2y_2+ 2x(x^2+1)y_1=2$
11) Differentiate: $\cos^2 x$ w.r.t. $e^{\sin x}$
12) Differentiate: $\cot^{-1}[\frac{\sqrt{1+sinx^1}}{\sqrt{1+sinx^1}} \pm \frac{\sqrt{1-sinx^1}}{\sqrt{1-sinx^1}}]$ w.r.t.x
13) If $x\sqrt{1+y^1}+ y\sqrt{1+x^1}=0$ prove that $\frac{dy}{dx}= \frac{-1}{(1+x)^2}$
14) Find the interval in which the fuction f given by $f(x)= \sin x+\cos x$; $0\le x\le 2\pi$ is strictly increasing or strictly decreasing.
15) A water tank has the shape of an inverted right circular cone with its axis vertical and vertex lowermost. Its semi-vertical angle is tan (0.5). Water is poured into it at a constant rate of 5 cubic meters per hour. Find the rate at which the level of the water is rising at the instant when the depth of water in the tank is 4m.
16) Show that the function f given by $f9x)= \tan^{-1}(\sin x+ \cos x)$; $x\ge 0$ always an strictly increasing function in $(0,\frac{\pi}{4})$
17) A point on the hypotenuse of a triangle is at distance 'a' and 'b' from the sides of the triangle. Show that the maximum length of the hypotenuse is $a^{2/3}+b^{2/3})^{3/2}$
18) Using differentiation find the approximate value of $(33)^{-1/5}$
19) Find the equation of the normal to the curve $x^2= 4y$ which passes through the point (1,2)
20) Find the equation of tangent to the curve $y= \cos(x+y)$; $-2\pi\le x\le 2\pi$ that are parallel to $x+2y=0$.