INDIAN SCHOOL AL WADI AL KABIR

Class XII, Mathematics ***Worksheet 2- Continuity and Differentiability***

28-06-20

Short answer type (2 marks)	
Q.1.	$Differentiate\ \ sin^2x\ with\ respect\ to\ e^{cosx}.$
Q.2	*Find the value of k so that the function is continuous at the given value:* $$f(x) = \begin{cases} kx+1, x \le \pi \\ cosx\ , x > \pi \end{cases}$$
Q.3	$Find\ \frac{dy}{dx}, if\ sin^2x + cosxy = \pi$
Q.4	$Find\ \frac{dy}{dx}, if\ y = sin^{-1}x + sin^{-1}\sqrt{1-x^2}$
Q.5	$Find\ \frac{dy}{dx}, if\ y = tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right)$
Q.6	$Find\ \frac{dy}{dx}, if\ x^3 + y^3 + xy = 10$
Q.7	*Find the values of a and b if the function f defined by* $$f(x) = \begin{cases} x^3+3x+a, x \le 1 \\ bx+2\ , x > 1 \end{cases} is\ differentiable\ at\ x = 1$$
Q.8	*Verify Rolle's theorem for the function* $f(x) = x^2 + 2x + 8, x \in [-4, 2]$
Q.9	*Verify mean value theorem for the function* $f(x) = 2sinx + sin2x, x \in [0, \pi]$
Q.10	$If\ x = e^{cos2t}\ and\ y = e^{sin2t}, prove\ that\ \frac{dy}{dx} = -\frac{ylogx}{xlogy}$
	Long answer type (4 Marks)
Q.11	$If\ f(x) = \begin{cases} \frac{\sin(a+1)x + 2sinx}{x}, x < 0 \\ 2, \quad x = 0 \\ \frac{\sqrt{1+bx}-1}{x}, x > 0 \end{cases}$ $is\ continuous\ at\ x = 0, find\ the\ values\ of\ a\ and\ b.$

Q.12	$If\ x\sqrt{1+y}+y\sqrt{1+x}=0, then\ prove: \frac{dy}{dx}=-\frac{1}{(1+x)^2}$
Q.13	$If\ x=a\left(cos\theta+log\ tan\frac{\theta}{2}\right), y=a\ sin\theta, then\ find\ \frac{dy}{dx}$
Q.14	$If\ x^py^q=(x+y)^{p+q}, then\ prove: \frac{dy}{dx}=\frac{y}{x}\ and\ \frac{d^2y}{dx^2}=0$
Q.15	$If\ f(x)=\sqrt{\frac{secx-1}{secx+1}}, find\ f'(\frac{\pi}{2})$
Q.16	$If\ x=a\ sinpt, y=b\ cospt, \quad then\ prove\ (a^2-x^2)\ y\frac{d^2y}{dx^2}+b^2=0$
Q.17	$If\ y=x^3(cosx)^x+sin^{-1}\sqrt{x}, then\ find\ \frac{dy}{dx}.$
Q.18	$If\ x\cos(a+y)=cosy, then\ prove: \frac{dy}{dx}=\frac{cos^2(a+y)}{sina}\ and\ sina.\frac{d^2y}{dx^2}+sin2(a+y)\frac{dy}{dx}=0$
Q.19	$If\ y=\frac{x}{2}\sqrt{a^2-x^2}+\frac{a^2}{2}sin^{-1}\frac{x}{a}, then\ find\ \frac{dy}{dx}$
Q.20	$If\ y=(tan^{-1}x)^2\ then\ prove: (1+x^2)^2\frac{d^2y}{dx^2}-x\frac{dy}{dx}=2$

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Answers

1	$-2cosx.e^{-cosx}$	**2**	$-\frac{2}{\pi}$	**3.**	$\frac{sin2x-ysinxy}{xsinxy}$	**4**	0
5	$\frac{3}{1+x^2}$	**6**	$-\frac{(3x^2+y)}{(3y^2+x)}$	**7**	$a=4, b=6$	**8**	$-1\in(-4,2)$
9	$\frac{\pi}{3}\in(0,\pi)$	**11**	$a=-1, b=4$	**13**	$tan\theta$	**15**	1
17	$x^2(cosx)^x[3-x^2tanx+xlogcosx]+\frac{1}{2\sqrt{x-x^2}}$					**19**	$\sqrt{a^2=x^2}$