

Topic :-DIFFERENTIATION

1. If $x = \exp\left\{\tan^{-1}\left(\frac{y-x^2}{x^2}\right)\right\}$, then $\frac{dy}{dx}$ equals

a) $2x[1 + \tan(\log x)] + x \sec^2(\log x)$	b) $x[1 + \tan(\log x)] + \sec^2(\log x)$
c) $2x[1 + \tan(\log x)] + x^2 \sec^2(\log x)$	d) $2x[1 + \tan(\log x)] + \sec^2(\log x)$

2. If $\sin y = x \sin(a + y)$, then $\frac{dy}{dx}$ is

a) $\frac{\sin a}{\sin^2(a + y)}$	b) $\frac{\sin^2(a + y)}{\sin a}$	c) $\sin a \sin^2(a + y)$	d) $\frac{\sin^2(a - y)}{\sin a}$
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3. $f(x) = e^x \sin x$, then $f''(x)$ is equal to

a) $e^{6x} \sin 6x$	b) $2e^x \cos x$	c) $8e^x \sin x$	d) $8e^x \cos x$
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4. If $f(x) = \cos x \cdot \cos 2x \cdot \cos 4x \cdot \cos 8x \cdot \cos 16x$, then the value of $f'\left(\frac{\pi}{4}\right)$ is

a) 1	b) $\sqrt{2}$	c) $\frac{1}{\sqrt{2}}$	d) 0
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5. If $\sec^{-1}\left(\frac{1+x}{1-x}\right) = a$, then $\frac{dy}{dx}$ is

a) $\frac{y-1}{x+1}$	b) $\frac{y+1}{x-1}$	c) $\frac{x-1}{y-1}$	d) $\frac{x-1}{y+1}$
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6. The derivative of $a^{\sec x}$ w.r.t. $a^{\tan x}$ ($a > 0$) is

a) $\sec x a^{\sec x - \tan x}$	b) $\sin x a^{\tan x - \sec x}$	c) $\sin x a^{\sec x - \tan x}$	d) $a^{\sec x - \tan x}$
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7. If $x = a \left\{ \cos \theta + \log \tan \left(\frac{\theta}{2}\right) \right\}$ and $y = a \sin \theta$, then $\frac{dy}{dx}$ is equal to

a) $\cot \theta$	b) $\tan \theta$	c) $\sin \theta$	d) $\cos \theta$
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8. If $\phi(x)$ is the inverse of the function $f(x)$ and $f'(x) = \frac{1}{1+x^5}$, then $\frac{d}{dx} \phi(x)$ is

a) $\frac{1}{1 + \{\phi(x)\}^5}$	b) $\frac{1}{1 + \{f(x)\}^5}$	c) $1 + \{\phi(x)\}^5$	d) $1 + f(x)$
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9. If $f(x) = 3e^{x^2}$, then $f'(x) - 2x f(x) + \frac{1}{3} f(0) - f'(0)$ is equal to

a) 0	b) 1	c) $(7/3)e^{x^2}$	d) e^{x^2}
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10. If $u = \log\left(\frac{x^2 + y^2}{x + y}\right)$, then the value of $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ is

- a) -1 b) 0 c) 1 d) 2
11. If $F(x) = \frac{1}{x^2} \int_4^x (4t^2 - 2F'(t)) dt$, then $F'(4)$ equals
a) $\frac{32}{9}$ b) $\frac{64}{3}$ c) $\frac{64}{9}$ d) $\frac{32}{3}$
12. If $y = \tan^{-1} \frac{\sqrt{1+x^2} - \sqrt{1-x^2}}{\sqrt{1+x^2} + \sqrt{1-x^2}}$, then $\frac{dy}{dx}$ is equal to
a) $\frac{x^2}{\sqrt{1-x^4}}$ b) $\frac{x^2}{\sqrt{1+x^4}}$ c) $\frac{x}{\sqrt{1+x^4}}$ d) $\frac{x}{\sqrt{1-x^4}}$
13. If $f(x) = |x^2 - 5x + 6|$, then $f'(x)$ equals
a) $2x - 5$ for $2 < x < 3$ b) $5 - 2x$ for $2 < x < 3$ c) $2x - 5$ for $2 \leq x \leq 3$ d) $5 - 2x$ for $2 \leq x \leq 3$
14. If $\sqrt{x+y} + \sqrt{y-x} = c$, then $\frac{d^2y}{dx^2}$ equals
a) $2/c$ b) $-2/c^2$ c) $2/c^2$ d) $-2/c$
15. Derivative of $x^6 + 6^x$ with respect to x is
a) $12x$ b) $x + 4$ c) $6x^5 + 6^x \log 6$ d) $6x^5 + x6^{x-1}$
16. If $f(x) = \cos^2 x + \cos^2(x + \frac{\pi}{3}) + \sin x \sin(x + \frac{\pi}{3})$ and $g(\frac{5}{4}) = 3$, then $\frac{d}{dx}(g \circ f(x)) =$
a) 1 b) 0 c) -1 d) None of these
17. If $y = \sin^{-1} \frac{x}{2} + \cos^{-1} \frac{x}{2}$, then the value of $\frac{dy}{dx}$ is
a) 1 b) -1 c) 0 d) 2
18. If $z = y + f(v)$, where $v = (\frac{x}{y})$, then $v \frac{\partial z}{\partial x} + \frac{\partial z}{\partial y}$ is
a) -1 b) 1 c) 0 d) 2
19. If $y = \tan^{-1} \left(\frac{\sqrt{x} - x}{1 + x^{3/2}} \right)$, then $y'(1)$ is equal to
a) 0 b) $\frac{1}{2}$ c) -1 d) $-\frac{1}{4}$
20. If $f(1) = 1$ and $f'(1) = 2$, then $\lim_{x \rightarrow 1} \frac{\sqrt{f(x)} - 1}{\sqrt{x} - 1}$ equals
a) 2 b) 4 c) 1 d) $1/2$