level-1 MOD PRACTICE

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Single Correct Answer Type

Level 1

1. If $x = \log p$ and $y = 1/p$, then

(a) $\frac{d^2y}{dx^2} - 2p = 0$ (b) $\frac{d^2y}{dx^2} + y = 0$

(c) $\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$ (d) $\frac{d^2y}{dx^2} - \frac{dy}{dx} = 0$

2. If $y = e^{\tan^{-1}x}$, then $(1+x^2)\frac{d^2y}{dx^2} =$

(a) $(1-2x)\frac{dy}{dx}$ (b) $-2x\frac{dy}{dx}$

(c) $-x\frac{dy}{dx}$ (d) 0

3. If $y = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots + \frac{x^n}{n!}$, then $\frac{dy}{dx} =$

(a) y (b) $y + \frac{x^n}{n!}$

(c) $y - \frac{x^n}{n!}$ (d) $y - 1 - \frac{x^n}{n!}$

4. $\frac{d}{dx}\cos^{-1}\left(\sqrt{\cos x}\right) =$

(a) $\frac{1}{2}\sqrt{1+\sec x}$ (b) $\sqrt{1+\sec x}$

(c) $-\frac{1}{2}\sqrt{1+\sec x}$ (d) $-\sqrt{1+\sec x}$

5. $\frac{d}{dx}\tan^{-1}\left(\frac{ax-b}{bx+a}\right) =$

(a) $\frac{1}{1+x^2} - \frac{a^2}{a^2+b^2}$ (b) $\frac{-1}{1+x^2} - \frac{a^2}{a^2+b^2}$

(c) $\frac{1}{1+x^2} + \frac{a^2}{a^2-b^2}$ (d) None of these

6. If $y = \sqrt{\frac{1-x}{1+x}}$, prove that $(1-x^2)\frac{dy}{dx} =$

(a) y^2 (b) $1/y$

(c) $-y$ (d) $-y/x$

7. $\frac{dy}{dx}$ for $y = \tan^{-1}\left\{\sqrt{\frac{1+\cos x}{1-\cos x}}\right\}$, $0 < x < \pi$ is

(a) $-1/2$ (b) 0

(c) 1 (d) -1

8. If $y = \tan^{-1}\sqrt{\frac{x+1}{x-1}}$ then $\frac{dy}{dx}$ is equal to

(a) $\frac{-1}{2|x|\sqrt{x^2-1}}$ (b) $\frac{-1}{2x\sqrt{x^2-1}}$

(c) $\frac{1}{2x\sqrt{x^2-1}}$ (d) None of these

9. If $y = ax^{n+1} + bx^{-n}$, then $x^2\frac{d^2y}{dx^2} =$

(a) $n(n-1)y$ (b) $n(n+1)y$

(c) ny (d) n^2y

10. If $y = \sqrt{(a-x)(x-b)} - (a-b)\tan^{-1}\sqrt{\frac{a-x}{x-b}}$, then $\frac{dy}{dx} =$

(a) 1 (b) $\sqrt{\frac{a-x}{x-b}}$

(c) $\sqrt{(a-x)(x-b)}$ (d) $\frac{1}{\sqrt{(a-x)(b-x)}}$

11. If $x = a\cos\theta$, $y = b\sin\theta$, then $\frac{d^3y}{dx^3}$ is equal to

(a) $-\frac{3b}{a^3}\operatorname{cosec}^4\theta\cot^4\theta$

(b) $\frac{3b}{a^3}\operatorname{cosec}^4\theta\cot\theta$

(c) $-\frac{3b}{a^3}\operatorname{cosec}^4\theta\cot\theta$

(d) None of these

12. If $y = \tan^{-1}\frac{4x}{1+5x^2} + \tan^{-1}\frac{2+3x}{3-2x}$, then $\frac{dy}{dx} =$

(a) $\frac{1}{1+25x^2} + \frac{2}{1+x^2}$ (b) $\frac{5}{1+25x^2} + \frac{2}{1+x^2}$

(c) $\frac{5}{1+25x^2}$ (d) $\frac{1}{1+25x^2}$

13. $\frac{d}{dx}\sqrt{\frac{1-\sin 2x}{1+\sin 2x}} =$

(a) $\sec^2 x$ (b) $-\sec^2\left(\frac{\pi}{4}-x\right)$

(c) $\sec^2\left(\frac{\pi}{4}+x\right)$ (d) $\sec^2\left(\frac{\pi}{4}-x\right)$

14. If $f(x) = \sqrt{1+\cos^2(x^2)}$, then $f'\left(\frac{\sqrt{\pi}}{2}\right)$ is

(a) $\sqrt{\pi}/6$ (b) $-\sqrt{(\pi/6)}$

(c) $1/\sqrt{6}$ (d) $\pi/\sqrt{6}$

15. If $y = \log_{\sin x}(\tan x)$, then $\left(\frac{dy}{dx}\right)_{\pi/4} =$

(a) $4/(\log 2)$ (b) $-4\log 2$

(c) $-4/(\log 2)$ (d) None of these

16. If $y = \frac{\sin^{-1}x}{\sqrt{1-x^2}}$, then $(1-x^2)\frac{dy}{dx}$ is equal to

(a) $x + y$ (b) $1 + xy$

(c) $1 - xy$ (d) $xy - 2$

17. If $y = \log\left(\frac{1+x}{1-x}\right)^{1/4} - \frac{1}{2}\tan^{-1}x$, then $\frac{dy}{dx} =$

(a) $\frac{x^2}{1-x^4}$ (b) $\frac{2x^2}{1-x^4}$

(c) $\frac{x^2}{2(1-x^4)}$ (d) None of these

18. If $y = \frac{\sqrt{x}(2x+3)^2}{\sqrt{x+1}}$, then $\frac{dy}{dx} =$

(a) $y\left[\frac{1}{2x} + \frac{4}{2x-3} - \frac{1}{2(x+1)}\right]$

(b) $y\left[\frac{1}{3x} + \frac{4}{2x+3} + \frac{1}{2(x+1)}\right]$

(c) $y\left[\frac{1}{3x} + \frac{4}{2x+3} + \frac{1}{x+1}\right]$

(d) None of these

19. If $f'(x) = \sqrt{2x^2-1}$ and $y = f(x^2)$ then $\frac{dy}{dx}$ at $x = 1$ is

(a) 2 (b) 1

(c) –2 (d) None of these

20. $x = t\cos t$, $y = t + \sin t$ then $\frac{d^2x}{dy^2}$ at $t = \frac{\pi}{2}$ is equal to

(a) $\frac{\pi+4}{2}$ (b) $-\frac{\pi+4}{2}$

(c) –2 (d) None of these

21. If $y = x - x^2$, then the derivative of y^2 with respect to x^2 is

(a) 1 – 2x (b) 2 – 4x

(c) 3x –2x² (d) 1 – 3x + 2x²

22. $\frac{d}{dx}\left[\tan^{-1}\left(\frac{\sqrt{x}(3-x)}{1-3x}\right)\right] =$

(a) $\frac{1}{2(1+x)\sqrt{x}}$ (b) $\frac{3}{(1+x)\sqrt{x}}$

(c) $\frac{2}{(1+x)\sqrt{x}}$ (d) $\frac{3}{2(1+x)\sqrt{x}}$

23. If $y\sqrt{x^2+1} = \log\{\sqrt{x^2+1} - x\}$, then $(x^2+1)\frac{dy}{dx} + xy + 1 =$

(a) 0 (b) 1

(c) 2 (d) None of these

24. If $y^x = x^y$, then $\frac{dy}{dx}$ is

(a) $\frac{y}{x}$ (b) $\frac{y(x\log y - y)}{x(y\log x - x)}$

(c) $\frac{x}{y}$ (d) $\frac{x\log y}{y\log x}$

25. The value of $\frac{d}{dx}(|x-1| + |x-5|)$ at $x = 3$ is

(a) –2 (b) 0

(c) 2 (d) 4

26. If $y = \sqrt{\cos x^2 + \sqrt{\cos x^2 + \sqrt{\cos x^2 + \ldots\ldots \text{to } \infty}}}$ then $\frac{dy}{dx}$ is equal to

(a) $\frac{-\sin}{2y-1}$ (b) $\frac{-2x\sin x^2}{2y-1}$

(c) $\frac{-\sin x^2}{x(2y-1)}$ (d) none of these

27. If $f(x) = \log|2x|$, $x \neq 0$, then $f'(x)$ is equal to

(a) 1/x (b) –1/x

(c) 1/|x| (d) none of these

28. If $x = a\sin 2\theta(1+\cos 2\theta)$, $y = b\cos 2\theta(1-\cos 2\theta)$, then $\frac{dy}{dx} =$

(a) $\frac{b\tan\theta}{a}$ (b) $\frac{a\tan\theta}{b}$

(c) $\frac{a}{b\tan\theta}$ (d) $\frac{b}{a\tan\theta}$

29. Let $y = e^{2x}$. Then $\left(\frac{d^2y}{dx^2}\right)\left(\frac{d^2x}{dy^2}\right)$ is:

(a) 1 (b) e^{-2x}

(c) $2e^{-2x}$ (d) $-2e^{-2x}$

30. If $y = e^{\sqrt{x}} + e^{-\sqrt{x}}$ then $xy'' + (1/2)y'$ is equal to

(a) y (b) $x\left(e^{\sqrt{x}} + e^{-\sqrt{x}}\right)$

(c) (1/4)y (d) $\sqrt{x}\,y$

31. $g(x) = \text{sgn}\sin x$, then $g'(1)$ equals

(a) 0 (b) – cos 1

(c) cos 1 (d) None of these

32. If $y = \sin^{-1}\left[\sqrt{x-ax} - \sqrt{a-ax}\right]$, then $\frac{dy}{dx}$ is equal to

(a) $\frac{1}{\sin\sqrt{a-ax}}$ (b) $\sin\sqrt{x}\,.\sin\sqrt{a}$

(c) $\frac{1}{2\sqrt{x}\sqrt{1-x}}$ (d) zero

33. The function y defined by the equation $xy - \log y = 1$ satisfies $x(yy'' + y'^2) - y'' + kyy' = 0$. The value k is

(a) – 3 (b) 3

(c) 1 (d) none of these

34. The equation $y^2e^{xy} = 9e^{-3}\cdot x^2$ defines y as a differentiable function of x. The value of $\frac{dy}{dx}$ for $x = -1$ and $y = 3$ is

(a) –15/2 (b) –9/5

(c) 3 (d) 15

35. If $x = \sin^{-1} t$ and $y = \log (1 - t^2)$; then $\left.\frac{d^2y}{dx^2}\right|_{t=1/2}$ is

(a) $-8/3$ (b) $8/3$

(c) $3/4$ (d) $-3/4$

36. $\frac{dy}{dx}$ for $y = \tan^{-1}\left\{\frac{1-\cos x}{\sin x}\right\}, -\pi < x < \pi$ is

(a) 1 (b) $1/2$

(c) $-1/2$ (d) -1

37. Let $y = \ln (1 + \cos x)^2$ then the value of $\frac{d^2y}{dx^2} + \frac{2}{e^{y/2}}$ equals

(a) 0 (b) $\frac{2}{1+\cos x}$

(c) $\frac{4}{(1+\cos x)}$ (d) $\frac{-4}{(1+\cos x)^2}$

Level 1

1.	(c)	**2.**	(a)	**3.**	(b)	**4.**	(a)	**5.**	(d)
6.	(c)	**7.**	(a)	**8.**	(a)	**9.**	(b)	**10.**	(b)
11.	(c)	**12.**	(c)	**13.**	(b)	**14.**	(b)	**15.**	(c)
16.	(b)	**17.**	(a)	**18.**	(a)	**19.**	(a)	**20.**	(b)
21.	(d)	**22.**	(d)	**23.**	(a)	**24.**	(b)	**25.**	(b)
26.	(b)	**27.**	(a)	**28.**	(a)	**29.**	(d)	**30.**	(c)
31.	(a)	**32.**	(c)	**33.**	(b)	**34.**	(d)	**35.**	(a)
36.	(b)	**37.**	(a)						