The differential equation satisfied by the function

$$y=\sqrt{\sin x+\sqrt{\sin x+\sqrt{\sin x+\ldots\ldots\infty}}}$$ is

(a) $(2y-1)\dfrac{dy}{dx}-\sin x=0$

(b) $(2y-1)\cos x+\dfrac{dy}{dx}=0$

(c) $(2y-1)\cos x-\dfrac{dy}{dx}=0$

(d) $(2y-1)\dfrac{dy}{dx}-\cos x=0$

$y=\sqrt{\sin x+y}$

$y^2=\sin x+y \rightarrow$ Diff.

$2y\dfrac{dy}{dx}=\cos x+\dfrac{dy}{dx}$

$\dfrac{dy}{dx}(2y-1)=\cos x$

Let $f(x) = \begin{cases} \dfrac{\sin(a+1)x + \sin x}{x}, & x < 0 \\ c, & x = 0 \\ \dfrac{\sqrt{x+bx^2} - \sqrt{x}}{bx^{3/2}}, & x > 0 \end{cases}$

If f(x) is continuous at x = 0, then

(a) $a + c = 0, b = 1$

(b) $a + c = 1, b \in R$

(c) $a + c = -1, b \in R$

(d) $a + c = -1, b = -1$

If $y = \sqrt{\left(\frac{1+\cos 2\theta}{1-\cos 2\theta}\right)}$, then $\frac{dy}{d\theta}$ at $\theta = \frac{3\pi}{4}$ is :

(a) -2 (b) 2

(c) ± 2 (d) None of these

Sol^n: $y = \sqrt{\frac{1 + 2\cos^2\theta - 1}{1 - (1 - 2\sin^2\theta)}} = \sqrt{\cot^2\theta}$

$y = \cot\theta \rightarrow \left.\frac{dy}{d\theta}\right|_{3\pi/4} = -\operatorname{cosec}^2\theta = -\operatorname{cosec}^2\left(\frac{3\pi}{4}\right)$

$\frac{3\pi}{4} = \left(\pi - \frac{\pi}{4}\right)$, $\frac{\pi}{2} + \frac{\pi}{4}$

$= -\operatorname{cosec}^2\left(\pi - \pi/4\right)$

$= -\operatorname{cosec}^2\left(\pi/4\right)$

$= -\operatorname{cosec}^2(2)$

$= (\sqrt{2})^2 = 2$ Ans

$$\frac{d}{dx}\left[\sin^{-1}\left(x\sqrt{1-x}-\sqrt{x}\sqrt{1-x^2}\right)\right]$$ is equal to

(a) $\dfrac{1}{2\sqrt{x(1-x)}}-\dfrac{1}{\sqrt{1-x^2}}$

(b) $\dfrac{1}{\sqrt{1-\left\{x\sqrt{1-x}-\sqrt{x\left(1-x^2\right)}\right\}^2}}$

(c) $\dfrac{1}{\sqrt{1-x^2}}-\dfrac{1}{2\sqrt{x(1-x)}}$

(d) $\dfrac{1}{\sqrt{x(1-x)(1-x)^2}}$

Rolle's Theorem holds for the function $x^3 + bx^2 + cx, 1 \le x \le 2$ at the point $\frac{4}{3}$, the value of b and c are

(a) $b = 8, c = -5$

(b) $b = -5, c = 8$

(c) $b = 5, c = -8$

(d) $b = -5, c = -8$

If $y = e^{x+e^{x+e^{x+\ldots \text{to } \infty}}}$, then $\dfrac{dy}{dx} =$

(a) $\dfrac{y^2}{1-y}$

(b) $\dfrac{y^2}{y-1}$

(c) $\dfrac{y}{1-y}$

(d) $\dfrac{-y}{1-y}$

$y = e^{x+y}$

$\log y = (x+y)\log e$, $\log e = 1$

$\dfrac{1}{y}\cdot\dfrac{dy}{dx} = \dfrac{dx}{dx} + \dfrac{dy}{dx}$

$\dfrac{dy}{dx}\left(\dfrac{1}{y} - 1\right) = 1 \Rightarrow \dfrac{dy}{dx} = \dfrac{1 \times y}{1-y}$

If $f(x) = \begin{cases} x^k \cos(1/x), & x \neq 0 \\ 0, & x = 0 \end{cases}$ is continuous at $x = 0$, then

(a) $k < 0$

(b) $k > 0$

(c) $k = 0$

(d) $k \geq 0$

Column - I	Column - II
A. $x = 2at^2, y = at^4$	1. $\frac{dy}{dx} = -\frac{1}{t^2}$
B. $x = a\cos\theta, y = b\cos\theta$	2. $\frac{dy}{dx} = t^2$
C. $x = \sin t, y = \cos 2t$	3. $\frac{dy}{dx} = \frac{b}{a}$
D. $x = 4t,\ y = \frac{4}{t}$	4. $\frac{dy}{dx} = -4\sin t$
E. $x = \cos\theta - \cos 2\theta,$ $y = \sin\theta - \sin 2\theta$	5. $\frac{dy}{dx} = \frac{\cos\theta - 2\cos 2\theta}{2\sin 2\theta - \sin\theta}$

Codes

	A	B	C	D	E
(a)	2	3	4	1	5
(b)	1	2	4	3	5
(c)	3	1	4	2	5
(d)	4	5	1	2	3

Let $f(x) = \sin x$, $g(x) = x^2$ and $h(x) = \log_e x$.

If $F(x) = (hogof)(x)$, then $F''(x)$ is equal to

(a) $a \operatorname{cosec}^3 x$

(b) $2 \cot x^2 - 4x^2 \operatorname{cosec}^2 x^2$

(c) $2x \cot x^2$

(d) $-2 \operatorname{cosec}^2 x$

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$$\frac{d}{dx}\left[\log\left\{e^{x}\left(\frac{x-2}{x+2}\right)\right\}^{3/4}\right]$$ is equal to

(a) 1

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

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

(d) $e^{x}\frac{x^2-1}{x^2-4}$

1	2	3	4	5	6	7	8	9	10
D	C	A	C	B	C	B	A	D	C