MATHS

BOOKS - CHHAYA PUBLICATION MATHS (BENGALI ENGLISH)

SECOND ORDER DERIVATIVE

Example

1. If f(x) =sin 3x cos4x, find f''(x). Then find the value of f''$\left(\frac{\pi}{2}\right)$.

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2. If y=$\tan^{-1}\left(\frac{x}{a}\right)$ find y_2.

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3. IF $y = \cos^{-1} x$, find $\frac{d^2y}{dx^2}$ in terms of y alone.

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4. If $y = e^{2x}$sin3x, find y''.

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5. Find $\frac{d^2y}{dx^2}$, when (i) $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ (ii) y= sin (x+y).

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6. If x=acos2t, y=asin2t, find the value of $\frac{d^2y}{dx^2}$ in terms of t.

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7. If x=2cosθ-cos2θ and y=2sinθ-sin2θ, find $\frac{d^2y}{dx^2}$ at $\theta = \frac{\pi}{2}$.

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8. If y=acos(logx)+bsin(logx), show, that,

$$x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0.$$

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9. IF $y = \left(x + \sqrt{1 + x^2}\right)^n$, Prove that, $(1 + x^2)y_2 + xy_1 = n^2 y$. Hence, find the value of $(y_2)_0$.

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10. If $y = \left(\sin^{-1} x\right)^2$, find the value of

$$(1 - x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} + 4$$

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11. If $y = e^{a\cos^{-1}x}(-1 \leq x \leq 1)$, show that ,

$$(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - a^2y = 0$$

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12. If $x = \sin t$ and $y = \sin pt$, prove that

$$(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} + p^2y = 0.$$

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13. If $2x = y^{\frac{1}{m}} + y^{-\frac{1}{m}}$, show that $(x^2 - 1)\frac{d^2y}{dx^2} + x\frac{dy}{dx} = m^2y.$

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14. IF x=f(t) and y=g(t) , prove that , $\frac{d^2y}{dx^2} = \frac{f_1g_2 - g_1f_2}{f_1^3}$ where suffixes denote differentiations w.r.t. t.

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15. Eliminate a and b from the equation

$$y = a\sin^{-1}x + b\cos^{-1}x.$$

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16. If $\frac{dx}{dy} = u$ and $\frac{d^2x}{dy^2} = v$, then the value of $\frac{d^2y}{dx^2}$ is -

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17. If y=xlog$\left(\frac{x}{a+bx}\right)$, prove that $x^3\frac{d^2y}{dx^2}=\left(y-x\frac{dy}{dx}\right)^2$.

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18. If $y=\frac{1}{1+x+x^2+x^3}$, then the value of $\frac{d^2y}{dx^2}$ at $x=0$ is -

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19. IF $x = e^t \sin t$ and $y = e^t \cos t$, then show that,

$$(x+y)^2 \frac{d^2y}{dx^2} = 2\left(x\frac{dy}{dx} - y\right).$$

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20. If y=cos (2$\sin^{-1}$x), prove that

$$(1-x^2)\frac{d^2y}{dx^2} + x\frac{dy}{dx} + 4 = 0$$

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21. Show that, y=sin(sinx) satisfies the equation

$$\frac{d^2y}{dx^2} + \tan x \frac{dy}{dx} + y \cos x = 0.$$

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22. Given,$y = \tan^{-1}\sqrt{x^2 - 1}$, if y_1 and y_2 are the first and second derivatives of y, then prove that $x\left(x^2 - 1\right)y_2 + \left(2x^2 - 1\right)y_1 = 0.$

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23. If $y = x^{n-1}\log x$, Prove that,

$$x^2\frac{d^2y}{dx^2} + (3-2n)x\frac{dy}{dx} + (n-1)^2 y = 0$$

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24. IF $ax^2 + 2hxy + by^2 = 1$, show that,

$$\frac{d^2y}{dx^2} = \frac{h^2 - ab}{(hx+by)^3}.$$

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25. If y=$\sin x \log\left(\tan \frac{x}{2}\right)$, show that, $\frac{d^2y}{dx^2} + y = \cot x.$

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26. Let $y = \left(\sin^{-1} x\right)^2 + \left(\cos^{-1} x\right)^2$, show that,

$$\left(1 - x^2\right) \frac{d^2y}{dx^2} - x \frac{dy}{dx} = 4$$

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27. Evaluate $\int_0^{2\pi} |\sin x| dx.$

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28. If $\sec\theta + \tan\theta = x$, find the value of $\sec\theta - \tan\theta$

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29. If $y = e^u$ and $u = f(x)$, show that,

$$\frac{d^2y}{dx^2} = e^u\left[\frac{d^2u}{dx^2} + \left(\frac{du}{dx}\right)^2\right]$$

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30. IF f(x)g(x)=a, for all x [a is a constant], show that,

$$\frac{g''(x)}{g'(x)} = \frac{f''(x)}{f'(x)} - \frac{2f'(x)}{f(x)}$$

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Exercise 4 Multiple Choice Type Question

1. If $y = \sqrt[3]{x^2}$ then the value of $\frac{d^2y}{dx^2}$ is-

A. $\frac{2}{9}x^{-\frac{4}{3}}$

B. $-\frac{2}{9}x^{-\frac{4}{3}}$

C. $-\frac{2}{3}x^{-\frac{4}{3}}$

D. $\frac{2}{3}x^{-\frac{4}{3}}$

Answer: B

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2. If $y^2 = 4ax$ then the value of $\frac{d^2y}{dx^2}$ is-

A. $-4a^2y^{-3}$

B. $4ay^3$

C. $-2ay$

D. $2ay^{-2}$

Answer: A

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3. IF $y = \cos^2 x$ then the value of $\left[\frac{d^2y}{dx^2}\right]_{x=\frac{\pi}{4}}$ is-

A. -1

B. -2

C. 1

D. 0

Answer: D

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4. If f(x) $= x^{\frac{3}{2}}$, then-

A. f'(0) and f''(0) both exists

B. none of f'(0) and f''(0) exists

C. f'(0) exists but f''(0) does not exists

D. none of these

Answer: C

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5. If $r = e^{-m\theta}$ then $\frac{d^2r}{d\theta^2}$ is-

A. $me^{-m\theta}$

B. $-m^2e^{-m\theta}$

C. $m^2e^{-m\theta}$

D. $-me^{-m\theta}$

Answer: C

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6. If y=tanx, then the value of $\frac{d^2y}{dx^2}$ is-

A. $2\sec^2 x$

B. $\sec^3 x$

C. $2\sec^2 x \tan x$

D. $\sec^2 x \tan x$

Answer: C

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7. If f(x)=log(cosx), then the value of f''(x) is-

A. $-\sec^2 x$

B. $-\cos ec^2 x$

C. $\sec^2 x$

D. $\cos ec^2 x$

Answer: A

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8. If f(x)=$\sin\frac{x}{2}$,then the value of f''(π) is-

A. $-\frac{1}{2}$

B. $\frac{1}{4}$

C. $\frac{1}{2}$

D. $-\frac{1}{4}$

Answer: D

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9. IF f(x)=log(3x+1), then the value of f'' (1) is-

A. $\frac{9}{16}$

B. $-\frac{9}{16}$

C. $\frac{9}{4}$

D. $-\frac{9}{4}$

Answer: B

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10. If $y = 2^{3-2x}$, then the value of $\frac{d^2y}{dx^2}$ is-

A. $4y(\log_e 2)^2$

B. $2y(\log_e 2)^2$

C. $-4y(\log_e 2)^2$

D. $4y(\log_e 2)$

Answer: A

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Very Answer Type Question

1. Find the seconds derivatives of each of the following functions w.r.t.x:

$x^5 - 6x$

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2. Find the seconds derivatives of each of the following functions w.r.t.x:

cotx

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3. Find the seconds derivatives of each of the following functions w.r.t.x:

$\log(x^2 - 4)$

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4. Find the seconds derivatives of each of the following functions w.r.t.x:

$\tan^{-1} x$

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5. Find $\frac{d^2y}{dx^2}$, When :

y=log(sin x)

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6. Find $\frac{d^2y}{dx^2}$, When :

y=2 sin xcos x at x=0

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7. Find $\frac{d^2y}{dx^2}$, When :

$y = 10^{2-3x}$

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8. Find $\frac{d^2y}{dx^2}$, When :

$y = \sin^3 x$

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9. Find $\frac{d^2y}{dx^2}$, When :

$y = x^2 \log x^2$ atx=1

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10. Find y_2, when:

y=cos3xsin4x

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11. Find y_2, when:

$$y = \frac{x}{2x - 3}$$

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12. Find y_2, when:

$$y = \log\left(\frac{a - x}{a + x}\right)$$

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13. Find y_2, when:

$$y = e^{4x} \cos 3x$$

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14. Find y_2, when:

$$y = \log\left(ax + x^2\right)$$

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15. Find y_2, when:

$$y = xe^{\frac{1}{x}}$$

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16. Find y_2, when:

$$y = \sin^2 x$$

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17. If $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, find $\frac{d^2y}{dx^2}$.

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18. If $x^2 + y^2 = 25$, find $\frac{d^2y}{dx^2}$ at x=0.

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19. If $y = \tan^{-1}(\sec x + \tan x)$, find $\frac{d^2y}{dx^2}$ at $x = \frac{\pi}{4}$.

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20. Find y_2 in each of the following cases:

$x = t, y = t^2$

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21. Find y_2 in each of the following cases:

$x = at^2, y = 2at$

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22. Find y_2 in each of the following cases:

$y = a\cos\theta, x = b\sin\theta$

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23. If y=Acosnt+Bsin nt(A,B,n are constants), show that $\frac{d^2x}{dx^2} + n^2x = 0.$

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Short Answer Type Question

1. Find f''(x) in each of the following cases:

$$f(x) = \frac{1}{x^2 - 5x + 6}$$

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2. Find f''(x) in each of the following cases:

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

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3. Find f''(x) in each of the following cases:

f(x)=sinx sin2x sin 3x

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4. Find f''(x) in each of the following cases:

$$f(x) = e^x \sin^2 x$$

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5. Find f''(x) in each of the following cases:

$$f(x) = x\sqrt{a^2 - x^2}$$

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6. Find $\frac{d^2y}{dx^2}$ when:

$$\tan y = \frac{\sqrt{1 + x^2} - 1}{x}$$

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7. Find $\frac{d^2y}{dx^2}$ when:

$y = \tan(x + y)$

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8. Find $\frac{d^2y}{dx^2}$ when:

$\sin x + \cos y = 1$

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9. Find $\frac{d^2y}{dx^2}$ when:

$x^p y^q = (x+y)^{p+q}$

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10. Find y_2 in each of the following cases:

$x = a\cos^3\theta, y = a\sin^3\theta$

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11. Find y_2 in each of the following cases:

$$x = a(\theta + \sin\theta), y = a(1 - \cos\theta)$$

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12. Find y_2 in each of the following cases:

$$x = a\left(t + \frac{1}{t}\right), y = a\left(t - \frac{1}{t}\right)$$

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13. Find y_2 in each of the following cases:

$$x = e^t, y = \sin t \text{ at } t = \frac{\pi}{2}$$

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14. Find y_2 in each of the following cases:

$$x = a(\cos\theta + \theta\sin\theta), y = a(\sin\theta - \theta\cos\theta)$$

at $\theta = \frac{\pi}{4}$

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15. Find y_2 in each of the following cases:

$$\sin x = \frac{2\tan\theta}{1+\tan^2\theta}, \cot y = \frac{1-\tan^2\theta}{2\tan\theta}$$

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16. Find y_2 in each of the following cases:

$$y = t^2 + t^3, x = t - t^4$$

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17. IF $y^3 = x^2 + y^2$, find $\frac{d^2y}{dx^2}$ at y=1.

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18. IF $y = \frac{x}{x^2 - x - 2}$, find the value of y_2 at x=1.

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19. IF y=xsinx, prove that,

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

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20. If $y = ae^{mx} + b\cos mx$, prove that,

$$\frac{d^2y}{dx^2} + m^2y = 2am^2e^{mx}$$

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21. IF $y = e^{-x}(\cos x + \sin x)$, show that ,

$y_2 + 2y_1 + 2y = 0.$

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22. If $y = e^x(\sin x + \cos x)$, then prove that,

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

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23. If $y = x^3 \log \frac{1}{x}$, Prove that ,

$xy_2 - 2y_1 + 3x^2 = 0.$

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24. If $y = \log\left(x + \sqrt{x^2 + a^2}\right)$, show that

$(a^2 + x^2)y_2 + xy_1 = 0$

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25. If $y = \left[\log\left(x + \sqrt{x^2 + 1}\right)\right]^2$, show that,

$(1 + x^2)\dfrac{d^2y}{dx^2} + x\dfrac{dy}{dx} = 2$

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26. IF y=secx+tanx, show that , $y_2 - yy_1 = 0.$

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27. If y=3cos(logx)+4sin(logx), Prove that

$$x^2 y_2 + x y_1 + y = 0$$

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28. IF y=xsin(logx)+xlogx, Prove that,

$$x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} + 2y = 2x \log x$$

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29. IF $y = x^2$cosx, prove that ,

$x^2 y_2 - 4xy_1 + \left(x^2 + 6\right)y = 0.$

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30. If cosx=ycos(a+x), prove that,

$\frac{d^2y}{dx^2} = 2\sin a \sec^2$(a+x)tan(a+x)

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31. If y=sin(logx), prove that , $x^2y_2 + xy_1 + y = 0.$

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32. If $\log y = \sin^{-1} x,$ show that, $(1 - x^2)\frac{d^2y}{dx^2} = x\frac{dy}{dx} + y.$

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33. IF y=cos(cos x), show that, $y_2 - y_1 \cot x + y \sin^2 x = 0.$

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34. If $y = \sin^{-1} x$, show that, $(1 - x^2) y_2 - x y_1 = 0.$

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35. If $y = \frac{\sin^{-1} x}{\sqrt{1 - x^2}}$, then show that $(1 - x^2)\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} - y = 0.$

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36. IF $x = (a + bt)e^{-nt}$, show that , $\frac{d^2x}{dt^2} + 2n\frac{dx}{dt} + n^2x = 0.$

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37. If $y = \tan^{-1} x$, prove that ,

$$(x^2 + 1)\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} = 0.$$

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38. If $y = \left(\tan^{-1} x\right)^2$, show that,

$$\left(1 + x^2\right)^2 \frac{d^2y}{dx^2} + 2x\left(1 + x^2\right)\frac{dy}{dx} - 2 = 0.$$

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39. If $y = e^{m\sin^{-1}x}(-1 \leq x \leq 1)$, Prove that,

$$(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} = m^2y.$$

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40. IF y=cos (msin^{-1}x), prove that ,

$$(1-x^2)y_2 - xy_1 + m^2y = 0.$$

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41. If y=sin $\left(2\sin^{-1}x\right)$, Prove that, $\left(1-x^2\right)\frac{d^2y}{dx^2}=x\frac{dy}{dx}-4y.$

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42. IF $y=3e^{2x}+2e^{3x}$, show that, $y_2-5y_1+6y=0.$

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43. IF $y = \frac{\log x}{x}$, show that, $\left[\frac{d^2y}{dx^2}\right]_{x=1} = -3.$

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44. IF $x^2 + y^2 = a^2$, show that, $\frac{(1+y_1^2)^{\frac{3}{2}}}{y_2} = -a$

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45. If $y = x^3$ then the value of $\dfrac{\dfrac{d^2y}{dx^2}}{\left[1+\left(\dfrac{dy}{dx}\right)^2\right]^{\frac{3}{2}}}$

at the point (1, 1) is -

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46. If $x = a\cos^3\theta$ and $y = a\sin^3\theta$ show that,

$$\frac{\left(1+y_1^2\right)^{\frac{3}{2}}}{y_2} = 3a\sin\theta\cos\theta$$

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47. IF $pv^{\gamma} = c$ [γ and c are constants], show that,

$$v^2 \frac{d^2p}{dv^2} = \gamma(\gamma + 1)p$$

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48. Eliminate a and b :

y=alogx+b

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49. Eliminate a and b :

xy=$ax^3 + b$

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50. Eliminate a and b :

$$xy = ax^2 + \frac{b}{x}$$

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Long Answer Type Question

1. IF $y = \sqrt{x+1} - \sqrt{x-1}$, Prove that,

$$(x^2 - 1)\frac{d^2y}{dx^2} + x\frac{dy}{dx} = \frac{1}{4}y$$

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2. IF y=A

$$\left(x + \sqrt{x^2 - 1}\right)^n + B\left(x - \sqrt{x^2 - 1}\right)^n,$$

Show that,

$$(1 - x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} + n^2y = 0$$

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3. IF $y = \left(\cos^{-1} x\right)^2$, prove that,

$$\left(1 - x^2\right)\frac{d^2y}{dx^2} - x\frac{dy}{dx} - 2 = 0.$$

Hence, find y_2 when x=0.

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4. If $y = e^x$, Prove that ,

$$xy_2 - (2x - 1)y_1 + (x - 1)y = 0.$$

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5. In the parabola $y^2 = 4ax$, prove that $\frac{d^2y}{dx^2} \cdot \frac{d^2x}{dy^2} = \frac{-2a}{y^3}$

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6. If x=cos t and y=log t , prove that at $t = \frac{\pi}{2}$, $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 = 0.$

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7. IF $x = t^2 + 2t, y = t^3 - 3t,$ where t is a parameter then show that, $\frac{d^2y}{dx^2} = \frac{3}{4(t+1)}.$

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8. If $y = ae^{t\sqrt{2}} + be^{-t\sqrt{2}}$ and x= sin t, show that,

$$(1 - x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 2y$$

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9. Evaluate $\int \sin 3x \sin 5x dx$.

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10. If $x = \frac{1}{z}$ and y=f(x), then prove that,

$$\frac{d^2 f}{dx^2} = 2z^3 \frac{dy}{dz} + z^4 \frac{d^2 y}{dz^2}$$

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11. Putting logx=z show that,

$$x^2 \frac{d^2 y}{dx^2} = \frac{d^2 y}{dz^2} - \frac{dy}{dz}.$$

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12. If $x = Ae^{-\frac{kt}{2}}\cos(pt + \in)$, and A,k,p, $\in$ are constants, show that $\frac{d^2x}{dt^2} + k\frac{dx}{dt} + n^2x = 0$, where $n^2 = p^2 + \frac{1}{4}k^2$.

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13. IF y^4+5xy+y=2, find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$, when x=0,y=1.

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14. If F(x) =f(x)ϕ(x) and f'(x)ϕ'(x)=a (a constant), then prove that ,$\frac{F''}{F} = \frac{f''}{f} + \frac{\phi''}{\phi} + \frac{2a}{f\phi}$, where $'' \equiv \frac{d^2}{dx^2}$, $' \equiv \frac{d}{dx}$ and F(x) $\neq$ 0.

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15. IF $y = e^{ax} \sin bx$, then prove that,

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

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16. If y=cosecx+cotx, then show that, $\frac{d^2y}{dx^2} = \frac{\sin x}{(1-\cos x)^2}$.

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17. IF $y^2 = ax^2 + 2bx + c$, Prove that $\frac{d^2x}{dy^2} = \frac{b^2 - ac}{(ax+b)^3}$.

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18. IF $y = Ae^{mx} + Be^{nx}$, show that $y_2 - (m+n)y_1 + mny = 0.$

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19. IF $x\sqrt{1+y} + y\sqrt{1+x} = 0$, show that,

$$\frac{dy}{dx} = -\frac{1}{(1+x)^2}$$

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20. IF $x\sqrt{1+y}+y\sqrt{1+x}=0$, show that,

$$\frac{d^2y}{dx^2}=\frac{2}{(1+x)^3}.$$

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21. IF $y=e^{m\sin^{-1}x}$, find the value of $(y_2)_0$.

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22. IF

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

show that

$$(2y-1)^3\frac{d^2y}{dx^2} = -\left[2\left(y^2-y\right)^2+y^2-y+2\right]$$

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Sample Question For Competitive Examination Multiple Correct Answer Type

1. Let $f(x) = e^{ax}\sin(bx+c)$and $f''(x) = r^2e^{ax}\sin(bx+\theta)$,then-

A. $r = a^2+b^2$

B. $r = \sqrt{a^2 + b^2}$

C. $\theta = c + 2\tan^{-1}\frac{b}{a}$

D. $\theta = 2a\tan^{-1}\left(\frac{b}{a}\right)$

Answer: B::C

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2. IF $x^3 - 2x^2y^2 + 5x + y - 5 = 0$ and y(1)=1,

then -

A. $y'(1) = \frac{4}{3}$

B. $y''(1) = \frac{-4}{3}$

C. $y''(1) = -8\frac{22}{27}$

D. $y'(1) = \frac{2}{3}$

Answer: A::C

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3. IF $y = e^x \sin x$and $z = e^x \cos x$, then-

A. y'=z

B. y''=2z

C. z''=-2y

D. z'=-y

Answer: B::C

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4. Let y=f(x) be a polynomial in x. the second order derivative of $f(e^x)$ at x=1 is-

A. $ef''(e) + f'(e)$

B. $(f''(e) + f'(e))e^2$

C. $y'(1) = ef'(e)$

D. $(f''(e)e + f'(e))e$

Answer: C::D

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5. IF u=$x^2 + y^2$ and x=s+3t,y=2s-t, then-

A. $\frac{dx}{ds} = 1$

B. $\frac{dy}{ds} = 2$

C. $\frac{d^2u}{ds^2} = 10$

D. $\frac{d^2y}{ds^2} = 0$

Answer: A::B::C::D

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Sample Question For Competitive Examination Integer Answer Type

1. IF $y = \sin\left(4\sin^{-1}x\right)$ satiesfies the relation $\left(1 - x^2\right)y_2 - xy_1 + 4Ay = 0$, then the value of A is -

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2. IF $y = e^t \cos t, x = e^t \sin t$ satisfies $y_2(x+y)^2 = A(xy_1 - y)$ then A is equal to-

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3. IF $y = (\cos t)^5$ and $x = \sin t$ then the value of $2\left(\frac{d^2y}{dx^2}\right)$ at $t = \frac{2\pi}{9}$ is-

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4. IF $\sqrt{x+y}+\sqrt{y-x}=c$ then $\frac{d^2y}{dx^2}=\frac{K}{c^2}$, find the value of K.

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5. IF $y=\left(1+\frac{1}{x}\right)^x$ then $\frac{2\sqrt{y_2(2)+\frac{1}{8}}}{\log\frac{3}{2}-\frac{1}{3}}$ is equal to

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Sample Question For Competitive Examination Matrix Match Type

1. Evaluate: $\int_0^1 \frac{\tan^{-1} x}{1+x^2} dx$

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2. If $y = \frac{x}{x+2}$ find $\frac{d^2y}{dx^2}$

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Sample Question For Competitive Examination Comprehension Type

1. $f(x) = x^2 + xg'(1) + g''(2)$ and $g(x) = x^2 f(1) + xf'(x) + f''(x)$.

the value of $f(1)$ is-

A. 1

B. 0

C. -1

D. -2

Answer: D

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2. $f(x) = x^2 + xg'(1) + g''(2)$ and

$g(x) = x^2 f(1) + xf'(x) + f''(x).$

the value of g(0) is-

A. 0

B. -3

C. 2

D. -2

Answer: C

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3. f(x)=$x^2 + xg'(1) + g''(2)$ and

$g(x) = f(1)x^2 + xg'(1) + f''(x)$.

The domain of the function $\sqrt{\frac{f(x)}{g(x)}}$ is-

A. $(-\infty, 1] \cup (2, 3]$

B. $(-2, 0] \cup (1, \infty]$

C. $(-\infty, 0] \cup \left(\frac{2}{3}, 3\right]$

D. none of these

Answer: C

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4. The function $u = e^x \sin x$ and $v = e^x \cos x$.

The value of $v\frac{du}{dx} - u\frac{dv}{dx}$ is-

A. $u^2 + v^2$

B. u+v

C. $u^2 - v^2$

D. u-v

Answer: A

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5. The function $u = e^x \sin x$ and $v = e^x \cos x$.

The value of $\frac{d^2u}{dx^2}$ is-

A. 2u

B. 2v

C. $\frac{u}{v}$

D. $\frac{v}{u}$

Answer: B

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6. The function $u = e^x \sin x$ and $v = e^x \cos x$.

The value of $\frac{d^2v}{dx^2}$ is-

A. 2u

B. 2v

C. $-2u$

D. $-2v$

Answer: C

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Sample Question For Competitive Examination Assertion Reason Type

1. Given, $x^2 + y^2 = 1$. Y' and y'' are first and second order derivative of y respectively.

Statement-I $1 + yy'' + (y')^2 = 0$

Statement- II $xx' + 2y = 0$

A. Statement-1 is true, Statement-2 is true, Statement-2 is a correct explanation for Statement-1

B. Statement-1 is true,Statement-2 is true,Statement-2 is not a correct explanation for Statement-1

C. Statement-1 is true,Statement-2 is False.

D. Statement-1 is False,Statement-2 is true.

Answer:

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2. Given, x=f(t),y=g(t) where t is a parameter.

Statement-I $\frac{d^2y}{dx^2} = \frac{g''(t)}{f''(t)}$

Statement-II

$$\frac{d^2y}{dx^2} = \frac{f'(t)g''(t) - g'(t)f''(t)}{\{f'(t)\}^3}$$

A. Statement-1 is true, Statement-2 is true, Statement-2 is a correct explanation for Statement-2

B. Statement-1 is true,Statement-2 is true,Statement-2 is not a correct explanation for Statement-2

C. Statement-1 is true,Statement-2 is False.

D. Statement-1 is False,Statement-2 is true.

Answer: D

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