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MATHS

BOOKS - TARGET MATHS (HINGLISH)

DIFFERENTIAL EQUATIONS

Classical Thinking

1. The order and degree of the differential equation $\left(\frac{d^2s}{dt^2}\right)^2 + 3\left(\frac{\mathrm{ds}}{\mathrm{dt}}\right)^2 + 4 = 0$ are

A. 2,2

B. 2,3

C. 3,2

D. 1,3

Answer: A

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2. The differential equation $x\left(\frac{d^2y}{dx^2}\right)^3+\left(\frac{\mathrm{dy}}{\mathrm{dx}}\right)^4 y=x^2$ is of

A. Degree 3 and order 2

B. Degree 1 and order 1

C. Degree 1 and order 3

D. Degree 4 and order 4

Answer: A

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3. The order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^3+\left(\frac{\mathrm{dy}}{\mathrm{dx}}\right)^4-xy=0$ are respectively

A. 2 and 4

B. 3 and 2

C. 4 and 5

D. 2 and 3

Answer: D

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4. $\frac{d^3y}{dx^3} + 2\left(1 + \frac{d^2y}{dx^2}\right) = 1$ has degree and order respectively as

A. 1,3

B. 2,3

C. 3,2

D. 3,1

Answer: A

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5. The second order differential equation is

A. $y'^2 + x = y^2$

B. $y'y'' + y\sin x$

C. y''' + y'' + y =0

D. y'=y

Answer: B

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6. The order and degree of the differential equation $\frac{d^4y}{dx^4} - 4\frac{d^3y}{dx^3} + 8\frac{d^2y}{dx^2} - 8\frac{dy}{dx} + 4y = 0$ are respectively

A. 4,1

B. 1,4

C. 1,1

D. 3,2

Answer: A

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7. y = 4sin 3x is a solution of the differential equation

A. $\frac{dy}{dx} + 8y = 0$

B. $\frac{dy}{dx} - 8y = 0$

C. $\frac{d^2y}{dx^2} + 9y = 0$

D. $\frac{d^2y}{dx^2} - 9y = 0$

Answer: C

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8. The differential equation whose solution is y=A sin x + B cos x , is

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

B. $\frac{d^2y}{dx^2} - y = 0$

C. $\frac{dy}{dx} + y = 0$

D. $\frac{dy}{dx} - y = 0$

Answer: A

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9. The differential equation of the family of curves y=a cos (x + b) is

A. $\frac{d^2y}{dx^2} - y = 0$

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

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

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

Answer: B

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10. If $y = ce^{\sin^{-1}x}$, then corresponding to this the differential equation is

A. $\frac{dy}{dx} = \frac{y}{\sqrt{1-x^2}}$

B. $\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$

C. $\frac{dy}{dx} = \frac{x}{\sqrt{1-x^2}}$

D. $\frac{dy}{dx} = \frac{\sqrt{1-x^2}}{y}$

Answer: A

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11. The elimination of the arbitrary constant k from the equation $y = (x+k)e^{-x}$ gives the differential equation

A. $\frac{dy}{dx} - y = e^{-x}$

B. $\frac{dy}{dx} - ye^{x} = 1$

C. $\frac{dy}{dx} + ye^{x} = 1$

D. $\frac{dy}{dx} + y = e^{-x}$

Answer: D

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12. The differential equation of the family of curves represented by the equation $x^2y = a.$ is

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

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

C. $\frac{dy}{dx} - \frac{2y}{x} = 0$

D. $\frac{dy}{dx} - \frac{2x}{y} = 0$

Answer: A

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13. The differential equation of the family of curves represented by the equation $x^2 + y^2 = a^2$, is

A. $x + y\frac{dy}{dx} = 0$

B. $y\frac{dy}{dx} = x$

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

D. $x + y\left(\frac{\mathrm{dy}}{\mathrm{dx}}\right)^2 = 0$

Answer: A

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14. The general solution of $x^2\frac{dy}{dx} = 2$ is

A. $y = c + \frac{2}{x}$

B. $y = c - \frac{2}{x}$

C. y=2cx

D. $y = c - \frac{3}{x^2}$

Answer: B

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15. The solution of the differential equation $\frac{dy}{dx} = x^2 + \sin 3x$ is

A. $y = \frac{x^3}{3} + \frac{\cos 3x}{3} + c$

B. $y = \frac{x^3}{3} - \frac{\cos 3x}{3} + c$

C. $y = \frac{x^3}{3} + \sin 3x + c$

D. $y = \frac{x^3}{3} - \sin 3x + c$

Answer: B

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16. The solution of the differential equation $\frac{dy}{dx} = \left(ae^{\mathrm{bx}} + c\cos mx\right)$ is

A. $y = \frac{ae^x}{b} + \frac{c}{m}$ sin mx + k

B. $y = ae^x + c\sin mx + k$

C. $y = \frac{ae^{\mathrm{bx}}}{b} + \frac{c}{m}$ sin mx + k

D. $y = ae^x - c\sin mx + k$

Answer: C

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17. The solution of the differential equation $\frac{dy}{dx} = \sec x(\sec x + \tan x)$ is

A. y=sec x + tan x + c

B. y=sec x + cot x + c

C. y=sec x - tan x +c

D. y=sec x - cot x+c

Answer: A

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18. The solution of $\frac{dy}{dx} = e^x(\sin x + \cos x)$ is

A. $y = e^x(\sin x - \cos x) + c$

B. $y = e^x(\cos x - \sin x) + c$

C. $y = e^x \sin x + c$

D. $y = e^x \cos x + c$

Answer: C

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19. The solution of the differential equation $\frac{dy}{dx} = e^x + \cos x + x + \tan x$ is

A. $y = e^x + \sin x + \frac{x^2}{2} + \log \cos x + c$

B. $y = e^x + \sin x + \frac{x^2}{2} + \log \sec x + c$

C. $y = e^x + \sin x - \frac{x^2}{2} + \log \cos x + c$

D. $y = e^x + \sin x - \frac{x^2}{2} + \log \sec x + c$

Answer: B

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20. The solution of $\left(1 + x^2\right) \frac{dy}{dx} = 1$ is

A. $y = \log\left(1 + x^2\right) + c$

B. $y + \log\left(1 + x^2\right) = c$

C. $y = \log(1 + x) = c$

D. $y = \tan^{-1} x + c$

Answer: D

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21. If $\frac{dy}{dx} + \frac{1}{\sqrt{1-x^2}} = 0$, then

A. $y + \sin^{-1} x = c$

B. $y^2 + 2\sin^{-1} x + c = 0$

C. $x + \sin^{-1} y = 0$

D. $x^2 + 2\sin^{-1} y = 1$

Answer: A

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22. The solution of the differential equation $\frac{dy}{dx} + \sin^2 y = 0$ is

A. y+2 cos y=c

B. y-2 sin y =c

C. x=cot y+c

D. y=cot x + c

Answer: C

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23. The solution of the differential equation $\frac{dy}{dx} + \frac{1+x^2}{x} = 0$ is

A. $y = -\frac{1}{2}\tan^{-1} x + c$

B. $y + \log x + \frac{x^2}{2} = c$

C. $y = \frac{1}{2}\tan^{-1} x + c$

D. $y - \log x - \frac{x^2}{2} = c$

Answer: B

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24. Solve the differential equation $\left(1+x^2\right)\frac{dy}{dx} = x.$

A. $y = \tan^{-1} x + c$

B. $y = -\tan^{-1} x + c$

C. $y = \frac{1}{2}\log_e\left(1 + x^2\right) + c$

D. $y = -\frac{1}{2}\log_e\left(1 + x^2\right) + c$

Answer: C

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25. The solution of $\frac{dy}{dx} = \left(\frac{y}{x}\right)^{1/3}$, is

A. $y^{2/3} + x^{2/3} = c$

B. $x^{1/3} + y^{1/3} = c$

C. $y^{2/3} - x^{2/3} = c$

D. $y^{1/3} - x^{1/3} = c$

Answer: C

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26. The solution of the differential equation $\frac{dy}{dx} = (1+x)(1+y^2)$ is -

A. $y = \tan(x^2 + x + c)$

B. $y = \tan(2x^2 + x + c)$

C. $y = \tan(x^2 - x + c)$

D. $y = \tan\left(\frac{x^2}{2} + x + c\right)$

Answer: D

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27. The solution of the differential equation $\frac{dy}{dx} = x \log x$ is

A. $y = x^2 \log x - \frac{x^2}{2} + e$

B. $y = \frac{x^3}{2}\log x - x^2 + c$

C. $y = \frac{1}{2}x^2 + \frac{1}{2}x^2 \log x + c$

D. $y = \frac{x^2}{2}\log x - \frac{x^2}{4} + c$

Answer: D

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28. The solution of $\frac{dy}{dx} = (x+y)^2$ is

A. x+y + tan(x+c) =0

B. x-y+tan (x+c)=0

C. x+y-tan(x+c)=0

D. x-y-tan(x+c)=0

Answer: C

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29. Integrating factor of $\frac{dy}{dx} + \frac{y}{x} = x^3 - 3$ is

A. x

B. logx

C. $-x$

D. e^x

Answer: A

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30. General solution of $\frac{dy}{dx} + \frac{y}{3} = 1$ is

A. $y = 3 + ce^{x/3}$

B. $y = 3 + ce^{-x/3}$

C. $3y = c + e^{x/3}$

D. $3y = c + e^{-x/3}$

Answer: B

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31. Solution of differential equation $\log\left(\frac{dy}{dx}\right) = x + y$ is

A. $e^x + e^y = 0$

B. $e^x + e^{-y} = c$

C. $e^{-x} + e^y = c$

D. $e^{-x} + e^{-y} = c$

Answer: B

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32. The solution of the differential equation $\frac{dy}{dx} + \frac{y}{x} = x^2$, is

A. $4xy = x^4 + c$

B. $xy = x^4 + c$

C. $\frac{1}{4}xy = x^4 + c$

D. $xy = 2x^4 + c$

Answer: A

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33. The solution of the equation $x\frac{dy}{dx} + 3y = x$ is

A. $x^3y + \frac{x^4}{4} = c$

B. $x^3y = \frac{x^4}{4} + c$

C. $x^3y + \frac{x^2}{2} = c$

D. $x^3y = \frac{x^2}{2} + c$

Answer: B

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34. The solution of the differential equation

$\frac{dy}{dx} + \frac{y}{x} = \sin x$ is

A. x(y+cos x) = sin x + c

B. x(y-cos x) = sin x +c

C. x(y+cos x) = cos x +c

D. x(y-cos x) = cos x + c

Answer: A

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35. The solution of the differential equation $\frac{dy}{dx} + y = \cos x$ is -

A. $y = \frac{1}{2}(\cos x + \sin x) + ce^{-x}$

B. $y = \frac{1}{2}(\cos x - \sin x) + ce^{-x}$

C. $y = \cos x + \sin x + ce^{-x}$

D. $y = \cos x - \sin x + ce^{-x}$

Answer: A

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36. Solution of $\cos x \frac{dy}{dx} + y \sin x = 1$ is :

A. y+sec x tan x =c

B. y sec x = tan x + c

C. y tan x = sec x +c

D. y tan x = sec x tan x +c

Answer: B

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37. The solution of the differential equation $\frac{dy}{dx} + y \cot x = 2 \cos x$ is

A. y sin x + cos 2x =2c

B. 2y sin x + cos x =c

C. y sin x + cos x =c

D. 2y sin x + cos 2x = c

Answer: D

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Critical Thinking

1. Degree of the given differential equation $\left(\frac{d^2y}{dx^2}\right)^3 = \left(1 + \frac{dy}{dx}\right)^{\frac{1}{2}}$ is

A. 2

B. 3

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

D. 6

Answer: D

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2. The degree of the differential equation $\frac{d^2y}{dx^2} + \sqrt{1 + \left(\frac{dy}{dx}\right)^3} = 0$ is

A. 1

B. 2

C. 3

D. 6

Answer: B

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3. The degree of the differential equation $3\frac{d^2y}{dx^2} = \left\{1 + \left(\frac{dy}{dx}\right)^2\right\}^{\frac{3}{2}}$ is

A. 1

B. 2

C. 3

D. 6

Answer: B

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4. The order and degree of the differential equation $\frac{d^2y}{dx^2} + \left(\frac{\mathrm{dy}}{\mathrm{dx}}\right)^{\frac{1}{3}} + x^{\frac{1}{4}} = 0$ are respectively

A. 2,3

B. 3,3

C. 2,6

D. 2,4

Answer: A

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5. Order and degree of the differential equation $\frac{d^2y}{dx^2} = \left\{y + \left(\frac{dy}{dx}\right)^2\right\}^{1/4}$ are

A. 4 and 2

B. 1 and 2

C. 1 and 4

D. 2 and 4

Answer: D

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6. The degree of the differential equation $\frac{d^2y}{dx^2} + 3\left(\frac{dy}{dx}\right)^2 = x^2 \log\left(\frac{d^2y}{dx^2}\right)$, is

A. 1

B. 2

C. 3

D. None of these

Answer: D

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7. The order and degree of the differential equation $\sqrt{\frac{dy}{dx}} - 4\frac{dy}{dx} - 7x = 0$ are

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

B. 2 and 1

C. 1 and 1

D. 1 and 2

Answer: D

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8. The degree of the differential equation $\frac{d^2y}{dx^2} - \sqrt{\frac{dy}{dx}} - 3 = x$ is

A. 2

B. 1

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

D. 3

Answer: A

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9. Find the degree of the differential equation:

$$\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{\frac{3}{4}} = \left(\frac{d^2y}{dx^2}\right)^{\frac{1}{3}}$$

A. 2

B. 4

C. 9

D. 3

Answer: B

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10. The order and degree of the differential equation $y = x\frac{dy}{dx} + \sqrt{a^2\left(\frac{dy}{dx}\right)^2 + b^2}$ are respectively

A. 1,2

B. 2,1

C. 1,1

D. 2,2

Answer: A

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11. The order and degree of $\left[1+\left(\frac{d^2y}{dx^2}\right)^3\right]^{4/5}=\left(\frac{m}{m+1}\right)\frac{d^3y}{dx^3}$ are respectively

A. 3,5

B. 3,3

C. 2,5

D. 3,2

Answer: A

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12. If m and n are the order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)+4\frac{\left(\frac{d^2y}{dx^2}\right)^2}{\left(\frac{d^3y}{dx^3}\right)}+\frac{d^3y}{dx^3}=x^2-1$, then

A. m=3 and n=5

B. m=3 and n=1

C. m=3 and n=3

D. m=3 and n=2

Answer: D

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13. Which of the following differential equation has the same order and degree?

A. $\frac{d^4y}{dx^4} + 8\left(\frac{dy}{dx}\right)^6 + 5y = e^x$

B. $5\left(\frac{d^3y}{dx^3}\right)^4 + 8\left(1 + \frac{dy}{dx}\right)^2 + 5y = x^8$

C. $\left[1 + \left(\frac{dy}{dx}\right)^3\right]^{2/3} = 4\frac{d^3y}{dx^3}$

D. $y = x^2\frac{dy}{dx} + \sqrt{1 + \left(\frac{dy}{dx}\right)^2}$

Answer: C

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14. The order of the differential equation whose solution is $x^2 + y^2 + 2gx + 2fy + c = 0$ is

A. 1

B. 2

C. 3

D. 4

Answer: C

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15. Write the order of the differential equation whose solution is $y = a\cos x + bs \in x + ce^{-x}$.

A. 3

B. 2

C. 1

D. 4

Answer: A

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16. The order of the differential equation of all circle of radius r, having centre on y-axis and passing through the origin, is

A. 1

B. 2

C. 3

D. 4

Answer: A

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17. The differential equation of all circles in the first quadrant which touch the coordiante axes is of order

A. 1

B. 2

C. 3

D. 4

Answer: A

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18. $y = ae^{mx} + be^{-mx}$ satisfies which of the following differential equations?

A. $\frac{dy}{dx} - my = 0$

B. $\frac{dy}{dx} + my = 0$

C. $\frac{d^2y}{dx^2} + m^2y = 0$

D. $\frac{d^2y}{dx^2} - m^2y = 0$

Answer: D

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19. Find the differential equation corresponding to $y = cx + c - c^3$, where c is arbitrary constant.

A. $x + y\frac{dy}{dx} = 0$

B. $y = x\frac{dy}{dx} + \frac{dy}{dx} - \left(\frac{\mathrm{dy}}{\mathrm{dx}}\right)^3$

C. $y + \frac{\mathrm{dy}}{\mathrm{dx}} = 0$

D. $x\left(\frac{\mathrm{dy}}{\mathrm{dx}}\right)^2 + \frac{\mathrm{dy}}{\mathrm{dx}} = 0$

Answer: B

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20. The differential equation, obtained on eliminating A and B from the equations $y = A\cos\omega wt + B\sin\omega t$ is

A. $y'' = -\omega^2 y$

B. $y'' - y = 0$

C. $y'' + y = 0$

D. $y'' - \omega^2 y = 0$

Answer: A

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21. If $y = ax^{n+1} + bx^{-n}, then x^2\frac{d^2y}{dx^2}$ is equal to $n(n-1)y$ (b) $n(n+1)y\, ny$ (d) n^2y

A. n(n-1)y

B. n(n+1)y

C. ny

D. n^2y

Answer: B

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22. The differential equation whose solution is $y = c_1 \cos ax + c_2 \sin ax$ is

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

B. $\frac{d^2y}{dx^2} + a^2y = 0$

C. $\frac{d^2y}{dx^2} + ay^2 = 0$

D. $\frac{d^2y}{dx^2} - a^2y = 0$

Answer: B

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23. The differential equation for which $\sin^{-1} x + \sin^{-1} y = c$ is given by

A. $\sqrt{1-x^2}dx + \sqrt{1-y^2}dy = 0$

B. $\sqrt{1-x^2}dy + \sqrt{1-y^2}dx = 0$

C. $\sqrt{1-x^2}dy - \sqrt{1-y^2}dx = 0$

D. $\sqrt{1-x^2}dx - \sqrt{1-y^2}dy = 0$

Answer: B

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24. Form the differential equation having $y = \left(\sin^{-1} x\right)^2 + A\cos^{-1} x + B, where A and B$ are arbitrary constants, as its general solution.

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

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

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

D. None of these

Answer: B

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25. The differntial equation of all straight line passing through origin is

A. $y = \sqrt{x\frac{\mathrm{dy}}{\mathrm{dx}}}$

B. $\frac{\mathrm{dy}}{\mathrm{dx}} = y + x$

C. $\frac{dy}{dx} = \frac{y}{x}$

D. $x + y\frac{dy}{dx} = 0$

Answer: C

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26. The solution of $\frac{dy}{dx} + y = e^x$ is

A. $2y = e^{2x} + c$

B. $2ye^{x} = e^{x} + c$

C. $2ye^{x} = e^{2x} + c$

D. $2ye^{2x} = 2e^{x} + c$

Answer: C

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27. The differential equation of all straight lines passing through the point (1,-1) is

A. $y = (x+1)\dfrac{\mathrm{dy}}{\mathrm{dx}} + 1$

B. $y = (x+1)\dfrac{\mathrm{dy}}{\mathrm{dx}} - 1$

C. $y = (x-1)\dfrac{dy}{dx} + 1$

D. $y = (x-1)\dfrac{dy}{dx} - 1$

Answer: D

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28. The differential equation representing the family of curves $y = xe^{cx}$ (c is a constant)is

A. $\frac{dy}{dx} = \frac{y}{x}\left(1 - \frac{\log y}{x}\right)$

B. $\frac{dy}{dx} = \frac{y}{x}\log\left(\frac{y}{x}\right) + 1$

C. $\frac{dy}{dx} = \frac{y}{x}\left(1 + \log\left(\frac{y}{x}\right)\right)$

D. $\frac{dy}{dx} + 1 = \frac{y}{x}\log\left(\frac{y}{x}\right)$

Answer: C

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29. The differential equation of all circles which passes through the origin and whose centers lie on Y-axis is

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

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

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

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

Answer: A

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30. The solution of the equation $\frac{dy}{dx} = e^{x-y} + x^2 e^{-y}$ is

A. $e^y = e^x + \frac{x^3}{3} + c$

B. $e^y = e^x + 2x + c$

C. $e^y = e^x + x^3 + e$

D. $y = e^x + c$

Answer: A

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31. Solution of differential equation $\log\left(\frac{dy}{dx}\right) = x + y$ is

A. $e^x + e^y = c$

B. $e^x + e^{-y} = c$

C. $e^{-x} + e^y = c$

D. $e^{-x} + e^{-y} = c$

Answer: B

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32. Solve the following differential equation:

$x \cos y \, dy = (xe^x \log x + e^x)dx$

A. $\sin y = \frac{1}{x}e^x + c$

B. $\sin y + e^x \log x = c$

C. $\sin y = e^x \log x + c$

D. $\sin y = xe^x + c$

Answer: C

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33. The solution of $\frac{dy}{dx} = 2^{y-x}$ is

A. $2^x + 2^y = c$

B. $2^x - 2^y = c$

C. $\frac{1}{2^x} - \frac{1}{2^y} = c$

D. x+y = c

Answer: C

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34. Solution of $\frac{dy}{dx} + 2xy = y$ is (a) $(b)(c)y = c(d)e^e(f)x - (g)x^{((h)2(i))(j)(k)}(l)(m)$ (n) (b) $(o)(p)y = c(q)e^r(s)(t)x^{((u)2(v))(w)-x(x)}(y)(z)$ (aa) (c)

$(d)(e)y = c(f)e^{(g)x(h)}(i)(j)$ (k) (d)

$(l)(m)y = c(n)e^{o}(p) - (q)x^{((r)2(s))(t)(u)}(v)(w)$ (x)

A. $y = ce^{x-x^2}$

B. $y = ce^{x^2-x}$

C. $y = ce^{x}$

D. $y = ce^{-x^2}$

Answer: A

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35. Solve the following differential equation: $\frac{dy}{dx} = \frac{1-\cos x}{1+\cos x}$

A. $y = 2\frac{\tan x}{2} - x + c$

B. y=2tan x +x +c

C. $y = 2\frac{\tan x}{2} + x + c$

D. $y = x - 2\frac{\tan x}{2} + c$

Answer: A

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36. Find the general solution of each of the following differential equations:

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

A. tan y+cot x =c

B. tan y cot x =c

C. tan y - cot x =c

D. tan y - sec x =c

Answer: C

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37. The solution of the differential equation $x\left(e^{2y}-1\right)dy+\left(x^2-1\right)e^y dx=0$ is

A. $e^y+e^{-y}=\log x-\frac{x^2}{2}+c$

B. $e^y-e^{-y}=\log x-\frac{x^2}{2}+c$

C. $e^y+e^{-y}=\log x+\frac{x^2}{2}+c$

D. $e^y-e^{-y}=\log x+\frac{x^2}{2}+c$

Answer: A

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38. The solution of the differential equation $x^2dy=-2xydx$ is

A. $xy^2=c$

B. $x^2y^2=c$

C. $x^2y=c$

D. xy=c

Answer: C

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39. The differential equations cos y dx = x dy has solution of the form

A. y=cos x

B. x =c (sec y + tan y)

C. x = c sin y

D. y=sin x

Answer: B

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40. The general solution of the differential equation $\frac{dy}{dx} = \cot x \cot y$ is

A. cos x =c cosec y

B. sin x = c sec y

C. sin x = c cos y

D. cos x = c sin y

Answer: B

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41. The solution of the differential equation $x \sec y \frac{dy}{dx} = 1$ is

A. x sec y tan y=c

B. cx=sec y +tan y

C. cy=sec x +tan x

D. cy=sec x +tan x

Answer: B

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42. The general solution of the equation $(e^y + 1)\cos x dx + e^y \sin x dx = 0$ is

A. $(e^y + 1)\cos x = c$

B. $(e^y - 1)\sin x = c$

C. $(e^y + 1)\sin x = c$

D. $(e^y - 1)\cos x = c$

Answer: C

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43. The general solution of the differential equation $ydx + \left(1 + x^2\right)\tan^{-1} x dy = 0$ is

A. $y\tan^{-1} x = c$

B. $x\tan^{-1} y = c$

C. $y + \tan^1 x = c$

D. $x + \tan^{-1} y = c$

Answer: A

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44. Solve : $3e^x \tan y dx + (1 - e^x)\sec^2 y \, dy = 0$

A. $\tan y = c(1 - e^x)^3$

B. $(1 - e^x)^3 \tan y = c$

C. tan y =c $(1 - e^x)$

D. $(1 - e^x)\tan y = c$

Answer: A

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45. The solution of the differential equation $(\sin x + \cos x)dy + (\cos x - \sin x)dx = 0$ is-

A. (sin x + cos x)=c

B. e^y (sin x + cos x) =c

C. e^y (cos x - sin x) =c

D. e^x (sin x -cos x) =c

Answer: B

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46. If $\frac{dy}{dx} = \frac{xy + y}{xy + x}$, then the solution of the differential equation is (A) $y = xe^x + c$ (B) $y = e^x + c$ (C) $y = Axe^{x-y}$ (D) $y = x + A$

A. $y = xe^x + c$

B. $y = e^x + c$

C. $y = Axe^{x-y}$

D. y=x+A

Answer: C

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47. The solution of the differential equation $x\frac{dy}{dx} + y = y^2$ is

A. y=1+cxy

B. y=log (cxy)

C. y+1 = cxy

D. y=c+xy

Answer: A

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48. The solution of the equation $(2y-1)dx - (2x+3)dy = 0$ is

A. $\frac{2x-1}{2y+3}=c$

B. $\frac{2y+1}{2x-3}=c$

C. $\frac{2x+3}{2y-1}=c$

D. $\frac{2x-1}{2y-1}=c$

Answer: C

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49. $(x-y^2x)dx=(y-x^2y)dy$

A. $(1-y^2)=c^2(1-x^2)$

B. $(1+y^2)=c^2(1-x^2)$

C. $(1+y^2)=c^2(1+x^2)$

D. $(1-y^2)=c^2(1+x^2)$

Answer: A

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50. Solution of the equation $(1-x^2)dy + xydx = xy^2dx$ is

A. $(y-1)^2(1-x)^2 = cy$

B. $(y-1)^2(1-x)^2 = c^2y^2$

C. $(y-1)^2(1+x^2) = c^2y^2$

D. $(y+1)^2(1-x^2) = c^2y^2$

Answer: B

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51. The solution of the differential eqaution

$(x^2 - yx^2)\frac{dy}{dx} + y^2 + xy^2 = 0$, is

A. $\log\left(\frac{x}{y}\right) = \frac{1}{x} + \frac{1}{y} + c$

B. $\log\left(\frac{y}{x}\right) = \frac{1}{x} + \frac{1}{y} + c$

C. $\log(xy) = \frac{1}{x} + \frac{1}{y} + c$

D. $\log(xy) + \frac{1}{x} + \frac{1}{y} = c$

Answer: A

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52. Solution of the differential equation $\frac{dy}{dx}\tan y = \sin(x+y) + \sin(x-y)$ is

A. sec y + 2 cos x =c

B. sec y - 2 cos x = c

C. cos y -2 sin x =c

D. tan y -2 sec y =c

Answer: A

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53. Solution of the differential equation $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$ is

A. 1+xy+c (y-x)=0

B. x+y=c (1-xy)

C. y-x=c (1+xy)

D. 1+xy=c(x+y)

Answer: C

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54. The solution of the differential equation $xy\frac{dy}{dx} = \frac{(1+y^2)(1+x+x^2)}{1+x^2}$ is:

A. $\frac{1}{2}\log(1+y^2) = \log x - \tan^{-1} x + c$

B. $\frac{1}{2}\log(1+y^2) = \log x + \tan^{-1} x + c$

C. $\log(1+y^2) = \log x - \tan^{-1} x + c$

D. $\log\left(1+y^2\right)=\log x+\tan^{-1}x+c$

Answer: B

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55. The solution of (cosec x log y) dy + $\left(x^2y\right)dx$=0 is

A. $\frac{\log y}{2}+\left(2-x^2\right)\cos x+2\sin x=c$

B. $\left(\frac{\log y}{2}\right)^2+\left(2-x^2\right)\cos x+2x\sin x=c$

C. $\frac{(\log y)^2}{2}+\left(2-x^2\right)\cos x+2x\sin x=c$

D. $\frac{(\log y)^2}{2}+\left(2-x^2\right)\cos x+2\sin x=c$

Answer: C

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56. The solution of the differential equaton

$\frac{dy}{dx} = \frac{x\log x^2 + x}{\sin y + y\cos y}$, is

A. $y\sin y = x^2 \log x + c$

B. $y\sin y \propto x^2 + c$

C. $y\sin y = x^2 + \log x + c$

D. y sin y = x log x +c

Answer: A

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57. The solution of the differential equation $\cos y \log(\sec x + \tan x)dx = \cos x \log(\sec y + \tan y)dy$ is (a) $\sec^2 x + \sec^2 y = c$ (b) $\sec x + \sec y = c$ (c) $\sec x - \sec y = c$ (d) Non of these

A. $\sec^2 x + \sec^2 y = c$

B. sec x + sec y =c

C. sec x -sec y =c

D. None of these

Answer: D

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58. The solution of the equation $\sqrt{a+x}\frac{dy}{dx}+x=0$ is

A. $3y+2\sqrt{a+x}.(2-2a)=3c$

B. $3y+2\sqrt{a+x}.(x-2a)=3c$

C. $3y+\sqrt{a+x}.(x+2a)=3c$

D. $3y+\sqrt{a+x}.(x-2a)=3c$

Answer: A

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59. The general solution of the differential equation $(1+xy)ydx+x(1-xy)dy=0$ is

A. $\frac{x}{y}+\frac{1}{xy}=k$

B. $\log\left(\frac{x}{y}\right)=\frac{1}{xy}+k$

C. $\frac{x}{y}=e^{xy}+k$

D. $\log\left(\frac{x}{y}\right)=xy+k$

Answer: B

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60. The solution of $ye^{-\frac{x}{y}}dx-\left(xe^{\left(-\frac{x}{y}\right)}+y^3\right)dy=0$ is (a) $(b)(c)(d)e^{(e)(f)-(g)\frac{x}{h}y(i)(j)(k)}(l)+(m)y^{(n)2(o)}(p)=C(q)$ (r) (b) *[Math Processing Error]* (ee) (c) $(d)(e)2(f)e^{(g)(h)-(i)\frac{x}{j}y(k)(l)(m)}(n)+(o)y^{(p)2(q)}(r)=C(s)$ (t) (d) *[Math Processing Error]* (kk)

A. $\frac{y^2}{2} + e^{-x/y} = k$

B. $\frac{x^2}{2} - e^{-xy} = k$

C. $\frac{x^2}{2} + e^{-x/y} = k$

D. $\frac{y^2}{2} - e^{-x/y} = k$

Answer: A

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61. What is the solution of $y' = 1 + x + y^2 + xy^2, y(0) = 0$?

A. $y^2 = \exp\left(x + \frac{x^2}{2}\right) - 1$

B. $y^2 = 1 + c\exp\left(x + \frac{x^2}{2}\right)$

C. $y = \tan\left(c + x + x^2\right)$

D. $y = \tan\left(x + \frac{x^2}{2}\right)$

Answer: D

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62. The solution of $y' - y = 1, y(0) = -1$ is given by $y(x) =$

A. $-\exp(x)$

B. $-\exp(-x)$

C. -1

D. 2exp(x)-1

Answer: D

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63. The solution of $e^{dy/dx} = (x+1), u(0) = 3$ is

A. y=x log x-x +2

B. y=(x+1)log (x+1)-x+3

C. y=(x+1)log (x+1)+x+3

D. y=x log x +x + 3

Answer: B

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64. The solution of $\frac{dy}{dx} + 1 = e^{x+y}$ is

A. $e^{-(x+y)} + x + c = 0$

B. $e^{-(x+y)} - x + c = 0$

C. $e^{(x+y)} + x + c = 0$

D. $e^{(x+y)} - x + c = 0$

Answer: A

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65. Solution of the equation : $\sin^{-1}\left(\frac{dy}{dx}\right) = x + y$ is

A. tan (x+y) + sec (x+y)=x+c

B. tan(x+y)-sec(x+y)=x+c

C. tan(x+y)+sec(x+y)+x=c

D. tan(x+y)-sec (x+y)+x =c

Answer: B

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66. The solution of the differential of the differential equation

$\frac{dy}{dx} = \sin(x+y)\tan(x+y) - 1$ is

A. cosec (x+y)+tan (x+y)=x+c

B. x+cosec (x+y)=c

C. x+tan (x+y)=c

D. x+sec (x+y)=c

Answer: B

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67. The solution of dy//dx=cos(x+y)+sin(x+y), is given by

A. $\log\left|1+\tan\left(\frac{x+y}{2}\right)\right| = x + c$

B. $\frac{1}{2}\left|\tan^{-1}\left(\frac{x+y+1}{2}\right)\right| = x + c$

C. $\tan^{-1}\left(\frac{x+y+1}{2}\right) = x + c$

D. $1 + \tan^{-1}\left(\frac{x+y}{2}\right) = x + c$

Answer: A

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68. The solution of differential equation $x^2\frac{dy}{dx} = x^2 + xy + y^2$ is

A. $\tan^{-1}\left(\frac{y}{x}\right) = \log x + c$

B. $\tan^{-1}\left(\frac{y}{x}\right) = -\log x + c$

C. $\sin^{-1}\left(\frac{y}{x}\right) = \log x + c$

D. $\tan^{-1}\left(\frac{x}{y}\right) = \log x + c$

Answer: A

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69. The solution of the equation $\frac{dy}{dx} = \frac{y}{x}\left(\log\frac{y}{x} + 1\right)$ is

A. $\log\left(\frac{y}{x}\right) = cx$

B. $\frac{y}{x} = \log y + c$

C. $\log\left(\frac{x}{y}\right) = cy$

D. $y = xy + c$

Answer: A

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70. The differential equation $(x + y)dx + xdy = 0$ is

A. $x^2 + y^2 = c$

B. $2x^2 - y^2 = c$

C. $x^2 + 2xy = c$

D. $y^2 + 2xy = c$

Answer: C

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71. The solution of the differential equation $x + y\frac{dy}{dx} = 2y$ is

A. $\log(y - x) = c + \frac{y - x}{x}$

B. $\log(y - x) = c + \frac{x}{y - x}$

C. $y - x = c + \frac{\log(x)}{y - x}$

D. $y - x = c + \frac{x}{y - x}$

Answer: B

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72. The general solution of

$y^2dx + \left(x^2 - xy + y^2\right)dy = 0$, is

A. $\tan^{-1}\left(\frac{x}{y}\right) - \log y = c$

B. $2\tan^{-1}\left(\frac{x}{y}\right) + \log x = c$

C. $\log\left(y + \sqrt{x^2 + y^2}\right) + \log y = c$

D. $\log y = \tan^{-1}\left(\frac{y}{x}\right) + c$

Answer: D

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73. The solution of the differential equation $2xy\frac{\mathrm{dy}}{\mathrm{dx}} = x^2 + 3y^2$ is

A. $x^3 + y^2 = px^2$

B. $\frac{x^2}{2} + \frac{y^2}{2} = y^2 + p$

C. $\frac{x^2}{2} + \frac{y^3}{x} = y^2$

D. $x^2 + y^2 = px^3$

Answer: D

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74. The solution of the differential equation $\frac{dy}{dx} = \frac{x}{2y - x}$ is

A. $(x - y)(x + 2y)^2 = c$

B. $y = x + c$

C. $(x + y)(x - 2y)^2 = c$

D. $y = \frac{x}{2y - x} + c$

Answer: A

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75. If $y' = \frac{x - y}{x + y}$, then its solution is

A. $y^2 + 2xy - x^2 = c$

B. $y^2 + 2xy + x^2 = c$

C. $y^2 - 2xy - x^2 = c$

D. $y^2 - 2xy + x^2 = c$

Answer: A

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76. Which of the following equation is non-linear ?

A. $\frac{dy}{dx} + \frac{y}{x} = \log x$

B. $y\frac{dy}{dx} + 4x = 0$

C. $dx + dy = 0$

D. $\frac{dy}{dx} = \cos x$

Answer: B

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77. Which of the following equation is linear ?

A. $\frac{dy}{dx} + xy^2 = 1$

B. $x^2\frac{dy}{dx} + y = e^x$

C. $\frac{dy}{dx} + 3y = xy^2$

D. $x\frac{dy}{dx} + y^2 = \sin x$

Answer: B

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78. Integrating factor of the equation $\left(x^2+1\right)\frac{\mathrm{dy}}{\mathrm{dx}} + 2xy = x^2 - 1$ is

A. $x^2 + 1$

B. $\frac{2x}{x^2+1}$

C. $\frac{x^2-1}{x^2+1}$

D. $\frac{x^2+1}{x^2-1}$

Answer: A

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79. The integrating factor of the differential equation $\frac{dy}{dx}\left(x(\log)_e x\right)+y=2(\log)_e x$ is given by (a) $(b)x(c)$ (d) (b) $(e)(f)(g)e^{(h)x(i)}(j)(k)$ (l) (c) $(m)(n)(o)((p)\log)_q e(r)(s)x(t)$ (u) (d) *[Math Processing Error]* (ii)

A. log x

B. log (log x)

C. e^x

D. x

Answer: A

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80. The integrating factor of the differential equation

$(1-x^2)\frac{dy}{dx} - xy = 1$, is

A. $-x$

B. $-\frac{x}{(1-x^2)}$

C. $\sqrt{(1-x^2)}$

D. $\frac{1}{2}\log(1-x^2)$

Answer: C

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81. An integrating factor of the differential equation

$x\frac{dy}{dx} + y\log x = xe^x x^{\frac{-1}{2}\log x}, (x > 0),$ is

A. $x^{\log + x}$

B. $(\sqrt{x})^{\log x}$

C. $(\sqrt{e})^{\log x}$

D. e^{x^2}

Answer: B

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82. The integrating factor of $\left(1+y^2\right)dx = \left(\tan^{-1}y - x\right)dy$ is -

A. $\tan^{-1}y$

B. $e^{\tan^{-1}y}$

C. $\dfrac{1}{1+y^2}$

D. $\dfrac{1}{x(1+y^2)}$

Answer: B

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83. The solution of the differential equation $\frac{dy}{dx} + 2y \cot x = 3x^2 \operatorname{cosec}^2 x$ is

A. $y \sin^2 x = x^3 + c$

B. y sin x =c

C. $y \cos x^2 = c$

D. $y \sin x^2 = c$

Answer: A

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84. The solution of $\frac{\mathrm{dy}}{\mathrm{dx}} + 2y \tan x = \sin x$ is

A. $y \sec^3 x = \sec^2 x + c$

B. $y \sec^2 x = \sec x + c$

C. y sin x = tan x+c

D. $y \sin^2 x = \tan x + c$

Answer: B

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85. The solution of the equation $\frac{dy}{dx} = \frac{1}{x + y + 1}$ is

A. $x = ce^y - y - 2$

B. $y = x + ce^y - 2$

C. $x + ce^y + y - 2 = 0$

D. $x - ce^y + y - 2 = 0$

Answer: A

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86. The solution of the differential equation $x\frac{\mathrm{dy}}{\mathrm{dx}} + y = x^2 + 3x + 2$ is

A. $xy = \frac{x^3}{3} + \frac{3}{2}x^2 + 2x + c$

B. $xy = \frac{x^3}{3} + x^2 + x + c$

C. $xy = \frac{x^4}{4} + \frac{x^3}{3} + x^2 + c$

D. $xy = \frac{x^4}{4} + x^3 + 2x^2 + c$

Answer: A

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87. The solution of the differential equation $x \log x \frac{dy}{dx} + y = 2 \log x$ is

A. y=log x +c

B. $y = \log x^2 + c$

C. $y \log x = (\log x)^2 + c$

D. y= x log x +c

Answer: C

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88. The solution of the differential equation

$$\frac{dy}{dx} + \frac{3x^2}{1+x^3}y = \frac{\sin^2 x}{1+x^3},$$ is

A. $y = \left(1+x^3\right) = x + \frac{1}{2}\sin 2x + c$

B. $y = \left(1+x^3\right) = cx + \frac{1}{2}\sin 2x + c$

C. $y = \left(1+x^3\right) = cx - \frac{1}{2}\sin 2x + c$

D. $y\left(1+x^3\right) = \frac{x}{2} - \frac{1}{4}\sin 2x + c$

Answer: D

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89. Solution of the differential equation $\frac{dy}{dx} + y\sec^2 x = \tan x \sec^2 x$ is

A. $y = \tan x - 1 + ce^{-\tan x}$

B. $y^2 = \tan x - 1 + ce^{\tan x}$

C. $ye^{\tan x} = \tan x - 1 + c$

D. $ye^{-\tan x} = \tan x - 1 + c$

Answer: A

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90. Solution of the equation $\left(x + 2y^3\right)\frac{dy}{dx} - y = 0, (y > 0)$ is

A. y(1-xy)=Ax

B. $y^3 - x = Ay$

C. x(1-xy)=Ay

D. x(1+xy)=Ay

Answer: B

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91. Solution of the equation $(x + \log y)dy + ydx = 0$ is

A. xy+y log y =c

B. xy + y log y-y=c

C. xy + log y -x =c

D. xy + log y + x =c

Answer: B

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92. The integrating factor of the differential equation $\frac{dy}{dx} = y\tan x - y^2 \sec x,$ is

A. tan x

B. sec x

C. $-\sec x$

D. cot x

Answer: B

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93. The solution of the differential equation $x\frac{dy}{dx} = 2y + x^3e^x,$ where y = 0 when x = 1 is

A. $y = x^3(e^x - e)$

B. $y = x^3(e - e^x)$

C. $y = x^2(e^x - e)$

D. $y = x^2(e - e^x)$

Answer: C

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94. If $xdy = y(dx + ydy), y(1) = 1$and $Y(x) > 0.$ Then, `y (-3)

is epual to

A. 1

B. 3

C. 5

D. -1

Answer: B

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95. The slope of the tangent to the curve at any point is equal to y + 2x.

Find the equation of the curve passing through the origin .

A. $y + 2(x + 1) = 2e^x$

B. $y - 2(x + 1) = 2e^x$

C. $y + (x + 1) = 2e^x$

D. $y - (x + 1) = 2e^x$

Answer: A

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96. The population of a town increases at a rate proportional to the population at that time . If the population increases from 40 thousands to 60 thousands in 40 years, What will be the population in another 20 years ? = [Given: $\sqrt{\frac{3}{2}} = 1.2247$]

A. 73382

B. 73482

C. 73582

D. 73682

Answer: B

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97. The rate of increases of bacteria in a certain culture is proportional to the number present. If it doubles in 5 hr., then in 25 hr., its number would be

A. 8 times the original

B. 16 times the original

C. 32 times the original

D. 64 times the original

Answer: C

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98. A body cool from $90^\circ C$ to $70^\circ C$ in 10 minutes if temperature of surrounding is $20^\circ C$ find the time taken by body to cool from $60^\circ C$ to $30^\circ C$. Assuming Newton's law of cooling is valid.

A. 20 minutes

B. 40 minutes

C. 60 minutes

D. 80 minutes

Answer: C

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99. The rate o growth of bacteria is proportional to the number present . IT intially, there were 1000 bacteria and the number doubles in 1 hours. Find the number of bacteria after $2\frac{1}{2}$ hours . [take $\sqrt{2} = 1.414$]

A. 5464

B. 5636

C. 5656

D. 6565

Answer: C

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Competitive Thinking

1. The order of the differential equation $1+\left(\frac{\mathrm{dy}}{\mathrm{dx}}\right)^{5}=\frac{d^{3}y}{dx^{3}}$ is

A. 5

B. 3

C. 1

D. 0

Answer: B

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2. Order and degree of the differential equation $y\frac{dy}{dx}=\frac{x}{\frac{dy}{dx}+\left(\frac{dy}{dx}\right)^{3}}$ respectively are

A. 1

B. 2

C. 3

D. 4

Answer: A

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3. The order of the differential equation $\left(\frac{d^3y}{dx^3}\right)^2 + \left(\frac{d^2y}{dx^2}\right)^2 + \left(\frac{dy}{dx}\right)^5$ =0 is

A. 3

B. 4

C. 1

D. 5

Answer: A

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4. The degree of the differential equation $\left[1+\left(\frac{\mathrm{dy}}{\mathrm{dx}}\right)^{2}\right]^{2}=\frac{d^{2}y}{dx^{2}}$ is

A. 1

B. 2

C. 3

D. 4

Answer: A

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5. Determine order and degree (if defined) of differential equations given

$(y^{m})^{2}+(y'')^{3}+(y')^{4}+y^{5}=0$

A. 3 and 2

B. 1 and 2

C. 2 and 3

D. 1 and 4

Answer: A

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6. The order and degree of the differential equation $5\left(\frac{d^2y}{dx^2}\right)+4\left(\frac{d^3y}{dx^3}\right)^2+\left(\frac{dy}{dx}\right)^3+2y+x^3=0$ are respectively

A. (2,5)

B. (3,2)

C. (1,3)

D. (2,3)

Answer: B

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7. The order and degree of the differential equation $y = x\frac{dy}{dx} + \frac{2}{\frac{dy}{dx}}$ are respectively

A. 1,2

B. 1,3

C. 2,1

D. 1,1

Answer: A

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8. The degree and order of the differential equation $y = x\left(\frac{dy}{dx}\right)^2 + \left(\frac{dx}{dy}\right)^2$ are respectively

A. 1,1

B. 2,1

C. 4,1

D. 1,4

Answer: C

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9. The order and degree of the differential equation $\left(1+3\frac{dy}{dx}\right)^{2/3}=4\frac{d^3y}{dx^3}$ are

A. $1, \frac{2}{3}$

B. 3,1

C. 3,3

D. 1,2

Answer: C

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10. The solution of $\frac{dy}{dx} = \left(\frac{x}{y}\right)^{-1/3}$ is

A. $x^{2/3} + y^{2/3} = c$

B. $y^{2/3} - x^{2/3} = c$

C. $x^{1/3} + y^{1/3} = c$

D. $y^{1/3} + x^{1/3} = c$

Answer: B

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11. The degree and order of the differential equation $\left[1 + \left(\frac{dy}{dx}\right)^3\right]^{\frac{7}{3}} = 7\left(\frac{d^2y}{dx^2}\right)$ respectively are

A. 3 and 7

B. 3 and 2

C. 7 and 3

D. 2 and 3

Answer: B

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12. The order and degree of the equation $\frac{d^3y}{dx^3} = \sqrt[5]{1 - \left(\frac{dy}{dx}\right)^7}$

A. 3,5

B. 7,3

C. 7,5

D. 5,3

Answer: A

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13. The order and degree of the differential equation $p = \left[\frac{1+\left(\frac{dy}{dx}\right)^2}{\frac{d^2y}{dx^2}}\right]^{\frac{3}{2}}$ respectively are

A. 2,2

B. 2,3

C. 2,1

D. None of these

Answer: C

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14. The order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^{\frac{1}{3}} + \left(x + \frac{dy}{dx}\right)^{1/2}$ =0 are

A. O=2 , D=2

B. O=2, D=$\frac{1}{3}$

C. $O = \frac{1}{2}$, D=2

D. O=2 , D=3

Answer: A

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15. If m and n are degree and order of $\left(1 + y_1^2\right)^{2/3} = y_2$, then the value of $\frac{\mathrm{m}+\mathrm{n}}{\mathrm{m}-\mathrm{n}}$ is

A. 3

B. 4

C. 5

D. 2

Answer: C

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16. The degree and order of the differential equation $t = px + \sqrt[3]{a^2p^2 + b^2}$, where $p = \frac{dy}{dx}$ are respectively

A. 3,1

B. 1,3

C. 1,1

D. 3,3

Answer: A

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17. The order and degree of the differential equation $\left[1 + \left(\frac{\mathrm{dy}}{\mathrm{dx}}\right)^2 + \sin\left(\frac{\mathrm{dy}}{\mathrm{dx}}\right)\right]^{\frac{3}{4}} = \frac{d^2y}{dx^2}$ are

A. Order =2 , degree = 4

B. Order =2, degree = not defined

C. Order =2 , degree =3

D. Order =2 , degree = $\frac{3}{4}$

Answer: B

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18. The degree of the differential equation $Y_2^{3/2} - Y_1^{1/2} - 4 = 0$ is :

A. 2

B. 3

C. 4

D. 6

Answer: D

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19. The order and degree of the differetnial equation $\sqrt{\sin x(dx+dy)}=\sqrt{\cos x(dx-dy)}$ are

A. (1,2)

B. (2,2)

C. (1,1)

D. (2,1)

Answer: C

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20. The degree of the differential equation

$$x=1\left(\frac{dy}{dx}\right)+\frac{1}{2!}\left(\frac{dy}{dx}\right)^2+\frac{1}{3!}\left(\frac{dy}{dx}\right)^3+\ldots..$$

A. 2

B. 3

C. 1

D. None of these

Answer: C

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21. The order of the diferential equation whose general solution is given by

$y = c_1 e^{2x+c_2} + c_3 e^x + c_4 \sin(x + c_5)$ is

A. 5

B. 4

C. 3

D. 2

Answer: B

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22. The solution of the differential equation $\left(\frac{dy}{dx}\right)^2 - x\frac{dy}{dx} + y = 0$ is

(a) $(b)(c)y = 2(d)$ (e) (b) $(f)(g)y = 2x(h)$ (i) (c) $(d)(e)y = 2x - 4(f)$

(g) (d) $(h)(i)y = 2(j)x^{(k)2(l)}(m) - 4(n)$ (o)

A. y=2

B. y=2x

C. y=2x-4

D. $y = 2x^2 - 4$

Answer: C

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23. $y = a + \frac{b}{x}$ is a solution of the differential equation

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

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

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

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

Answer: B

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24. If $y = e^{-x}\cos 2x$ then which of the following differential equations is satisfied?

A. $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 5y = 0$

B. $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 2y = 0$

C. $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} - 2y = 0$

D. $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} - 5y = 0$

Answer: A

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25. The differential equation of the family of straight line $y = mx + \frac{4}{m}$, where m is the parameter, is

A. $y\left(\frac{dy}{dx}\right) = x\left(\frac{dy}{dx}\right)^2 + 4$

B. $y\frac{d^2y}{dx^2} = x\left(\frac{dy}{dx}\right)^2 + 4x$

C. $y\left(\frac{dy}{dx}\right)^2 = 4x^2$

D. $y\frac{dy}{dx} = \left(\frac{dy}{dx}\right)^2 + 4$

Answer: A

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26. The differential equation of $y = ae^{bx}$ is

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

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

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

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

Answer: A

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27. If $y = \frac{A}{x} + Bx^2$, then $x^2\frac{d^2y}{dx^2}$ =

A. 2y

B. y^2

C. y^3

D. y^4

Answer: A

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28. Form the differential equation corresponding to $y = e^{mx}$ by eliminating m.

A. $\frac{\mathrm{dy}}{\mathrm{dx}} = \left(\frac{y}{x}\right)\log y$

B. $\frac{\mathrm{dy}}{\mathrm{dx}} = \left(\frac{1}{y}\right)\log y$

C. $\frac{dy}{dx} = \left(\frac{x}{y}\right)\log y$

D. $\frac{dy}{dx} = \left(\frac{x}{y}\right)\log x$

Answer: A

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29. The differential equation of the family of curves $y = e^{x}(A\cos x + B\sin x)$, where A and B are arbitrary constants is (a) $(b)(c)(d)\frac{(e)(f)d^{(g)2(h)}(i)y}{j}\Big((k)d(l)x^{(m)2(n)}(o)\Big)(p)(q) - 2(r)\frac{(s)dy}{t}((u)$ (y) (z) *[Math Processing Error]* (xx) (yy) *[Math Processing Error]* (eeee) (ffff) *[Math Processing Error]* (ddddd)

A. y''-2y'+2y=0

B. y''+2y'-2y=0

C. $y'' + y'^2 + y = 0$

D. y''+2y'-y=0

Answer: A

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30. if $y = a\sin(\log x) + b\cos(\log x)$, then the differential equation without the parameter a and b is

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

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

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

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

Answer: C

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31. Family of curves $y = Ax + A^3$ is represented by the differential equation of degree

A. Three

B. Two

C. One

D. None of these

Answer: A

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32. Form the differential equation of simple harmonic motion given by $x = A\cos(nt + \alpha)$, where n is fixed and A, α are parameters.

A. $\frac{d^2x}{dt^2} - n^2x = 0$

B. $\frac{d^2x}{dt^2} + n^2x = 0$

C. $\frac{dx}{dt} - \frac{d^2x}{dt} = 0$

D. $\frac{d^2x}{dt^2} - \frac{dx}{dt} + nx = 0$

Answer: B

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33. The family of curves $y = e^{a\sin x}$ where a is an arbitrary constant , is represented by the differential equation

A. $\log y = \tan x \frac{\mathrm{dy}}{\mathrm{dx}}$

B. $y\log y = \tan x \frac{\mathrm{dy}}{\mathrm{dx}}$

C. $y\log y = \sin x \frac{\mathrm{dy}}{\mathrm{dx}}$

D. $\log y = \cos x \frac{dy}{dx}$

Answer: B

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34. The differentiala equation representing the family of curves $y^2 = 2k\left(x + \sqrt{k}\right)$ where k is a positive parameter, is of

A. order 2

B. degree 2

C. degree 3

D. degree 4

Answer: C

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35. The order of the differential equation of all parabolas , whose latus rectum is 4a and axis parallel to the x- axis is

A. one

B. four

C. three

D. two

Answer: D

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36. The degree and order of the differential equation of the family of all parabolas whose axis is x-axs are respectively

A. 2,1

B. 1,2

C. 3,2

D. 2,3

Answer: B

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37. The differential equation satistied by the family of curves $y - ax\cos\left(\frac{1}{x} + b\right)$, where a,b are parameters, is

A. $x^2y_2 + y = 0$

B. $x^4y_2 + y = 0$

C. $xy_2 - y = 0$

D. $x^4y_2 - y = 0$

Answer: B

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38. Form the differential equation representing the parabolas having vertex at the origin and axis along positive direction of x-axis.

A. $y^2 - 2xy\frac{dy}{dx} = 0$

B. $y^2 + 2xy\frac{dy}{dx} = 0$

C. $y^2 - 2xy\frac{d^2y}{dx^2} = 0$

D. $y^2 + 2xy\frac{d^2y}{dx^2} = 0$

Answer: A

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39. The differential equation of the family of parabolas with focus at the origin and the X-axis as axis, is

A. $y\left(\frac{dy}{dx}\right)^2 + 4x\frac{dy}{dx} = 4y$

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

C. $y\left(\frac{dy}{dx}\right)^2 + y = 2xy\frac{dy}{dx}$

D. $y\left(\frac{dy}{dx}\right)^2 + 2xy\frac{dy}{dx} + y = 0$

Answer: B

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40. If m and n are respectively the order and degree of the differential equation of the family of parabolas with focus at the origin and X-axis as its axis , the mn-m + n=

A. 1

B. 4

C. 3

D. 2

Answer: C

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41. The differential equation of all parabolas having their axes of symmetry coincident with the axes of x, is

A. $y\frac{dy}{dx} + \left(\frac{\mathrm{dy}}{\mathrm{dx}}\right)^2 = 0$

B. $y\frac{d^2y}{dx^2} + \left(\frac{\mathrm{dy}}{\mathrm{dx}}\right)^2 = 0$

C. both (A) and (B)

D. None of these

Answer: B

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42. All parabolas whose axis is the Y-axis.

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

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

C. $\frac{d^2y}{dx^2} - y = 0$

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

Answer: A

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43. Form the differential equation of the family of circles touching the y-axis at origin.

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

B. $x^2-y^2+2xy\frac{dy}{dx}=0$

C. $\left(x^2-y^2\right)\frac{\mathrm{dy}}{\mathrm{dx}}-2xy=0$

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

Answer: B

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44. Form the differential equation of the family of circles touching the y-axis at origin.

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

B. $x^2-y^2+2xy\frac{dy}{dx}=0$

C. $\left(x^2-y^2\right)\frac{\mathrm{dy}}{\mathrm{dx}}-2xy=0$

D. $\left(x^2 - y^2\right)\dfrac{\mathrm{dy}}{\mathrm{dx}} + 2xy = 0$

Answer: B

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45. The differential equation of the family of circles passing through the origin and having centres on the x-axis is

A. $y^2 + x^2 + \dfrac{dy}{dx} = 0$

B. $y^2 - x^2 + \dfrac{dy}{dx} = 0$

C. $y^2 + x^2 + 2xy\dfrac{\mathrm{dy}}{\mathrm{dx}} = 0$

D. $y^2 - x^2 - 2xy\dfrac{\mathrm{dy}}{\mathrm{dx}} = 0$

Answer: D

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46. Find the differential equation of all straight lines, which are at a unit distance from origin.

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

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

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

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

Answer: C

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47. The solution of the differential equation $\sec x dy - \text{cosec}\ \ ydx = 0$ is

A. cos x -sin y=c

B. sin x -cos y =c

C. sin x + cos y =c

D. None of these

Answer: C

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48. What is the solution of the differential equation

$\frac{dy}{dx} = xy + x + y + 1$?

A. $\log(1+y) = x + \frac{x^2}{2} + c$

B. $(1+y)^2 = x + \frac{x^2}{2} + c$

C. log (1+y) = log (1+x) + c

D. None of these

Answer: A

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49. The solution of the differential equation $9y\frac{dy}{dx} + 4x = 0$ is

A. $\frac{y^2}{9} + \frac{x^2}{4} = c$

B. $\frac{y^2}{4} + \frac{x^2}{9} = c$

C. $\frac{y^2}{9} - \frac{x^2}{4} = c$

D. $\frac{y^2}{4} - \frac{x^2}{9} = c$

Answer: B

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50. The solution of the differential equation $\left(1+y^2\right)\tan^{-1}x dx + \left(1+x^2\right)2y dy = 0$ is

A. $\left|1+x^2\right|\left|1+e^{2y}\right| = c$

B. $\left(\tan^{-1}x\right)^2 + 2\log\left|1+y^2\right| = c$

C. $\tan^{-1}x + \log\mid 1+y^2 = c$

D. $\frac{1}{2}\left(\tan^{-1}x\right)^2 + 2\log|1+y^2| = c$

Answer: B

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51. Solution of the differential equation $x\left(\frac{dy}{dx}\right)^2 + 2\sqrt{xy}\frac{dy}{dx} + y = 0$ is

A. x + y= a

B. $\sqrt{x} - \sqrt{y} = \sqrt{a}$

C. $\sqrt{x} + \sqrt{y} + \sqrt{a}$

D. $x^2 + y^2 = a^2$

Answer: C

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52. The order of the differential equation $\frac{dx}{x} + \frac{dy}{y} = 0$ is

A. log x. log y=c

B. x+y=c

C. $\frac{1}{y}+\frac{1}{x}=c$

D. xy=c

Answer: D

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53. The solution of the differential equation $x\frac{dy}{dx}-y+3=0$ represents a family of

A. straight line

B. circles

C. parabolas

D. ellipses

Answer: A

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54. Solution of the differential equation $\frac{dy}{dx} = \frac{y(1+x)}{x(y-1)}$ is

A. log xy+x+y=c

B. $\log\left(\frac{x}{y}\right) + x - y = c$

C. log xy+x-y=c

D. None of these

Answer: C

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55. The solution of the differential equation $y(1+\log x)\frac{dx}{dy} - x\log x = 0$ is

A. log (log x) -sin y =c

B. log (log x) =y +c

C. x log x =cy

D. x log x = y +c

Answer: C

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56. The solution of the differential equation

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

A. (x+a)(x+ay)=cy

B. (x+a)(1-ay)=cy

C. (x+a)(1-ay)=c

D. None of these

Answer: B

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57. What is the solution of the differential equation

$$\frac{dy}{dx} + \sqrt{\frac{1-y^2}{1-x^2}} = 0?$$

A. $x\sqrt{1-y^2} - y\sqrt{1-x^2} = c$

B. $x\sqrt{1-y^2} + y\sqrt{1-x^2} = c$

C. $x\sqrt{1+y^2} + y\sqrt{1+x^2} = c$

D. None of these

Answer: B

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58. The general solution of the differential equation $\frac{dy}{dx} + \frac{\sin(x+y)}{2} = \frac{\sin(x-y)}{2}$ is (a) $(b)(c)\log\tan\left((d)(e)(f)\frac{y}{g}2(h)(i)(j)\right) = c - 2\sin x(k)$ (l) (m) *[Math Processing Error]* (ee) (ff) *[Math Processing Error]* (uu) (vv) $(ww)(\times)\log\tan\left((yy)(zz)(aaa)\frac{y}{bbb}4(ccc)(ddd) + (eee)\frac{\pi}{fff}4(ggg)(hhh)\right.$ (rrr)

A. $\log \tan\left(\frac{y}{2}\right) = c - 2\sin x$

B. $\log \tan\left(\frac{y}{4}\right) = c - 2\sin\left(\frac{x}{2}\right)$

C. $\log \tan\left(\frac{y}{2} + \frac{\pi}{4}\right) = c - 2\sin x$

D. $\log \tan\left(\frac{y}{4} + \frac{\pi}{4}\right) = c - 2\sin\left(\frac{x}{2}\right)$

Answer: B

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59. The solution of $\frac{dy}{dx} = 1 + y + y^2 + x + xy + xy^2$ is

A. $\frac{2}{\sqrt{3}}\tan^{-1}\left(\frac{2y+1}{\sqrt{3}}\right) = x + x^2 + c$

B. $4\tan^{-1}\left(\frac{2y-1}{\sqrt{3}}\right) = \frac{\sqrt{3}}{2}(2x + x^2) + c$

C. $\sqrt{3}\tan^{-1}\left(\frac{3y+1}{\sqrt{3}}\right) = 4(1 + x + x^2) + c$

D. $4\tan^{-1}\left(\frac{2y+1}{\sqrt{3}}\right) = \sqrt{3}(2x + x^2) + c$

Answer: D

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60. The solution of the differential equation $\frac{dy}{dx} = 3^{x+y}$ at x=0=y is

A. $3^x + 3^{-y} - 2 = 0$

B. $3^x - 3^{-y} - 2 = 0$

C. $3^x + 3^{-y} + c = 0$

D. $3^x + 3^{-y} - c = 0$

Answer: A

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61. The particular solution of the differential equation xdy + 2 y dx = 0, when x = 2,

A. xy=4

B. $x^2y = 4$

C. $xy^2 = 4$

D. $x^2y^2 = 4$

Answer: B

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62. The solution of the differential equation $2x\frac{dy}{dx} - y = 0$, y(1)=2 represents _____

A. ellipse

B. parabola

C. circle

D. straight line

Answer: B

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63. Particular solution of differential equation $e^{\frac{dy}{dx}}$ =x:y (1) = 3 , x gt 0 is

_____

A. $2y = x^2 + 5$

B. y=x log x-x + 4

C. $\log y = x^2 + 4$

D. $y^2 = \log x + 4$

Answer: B

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64. The solution of $\log. \frac{dy}{dx} = x$ when $y = 1$ and $x = 0$ is :

A. $e^x + 1$

B. e^{-x}

C. e^x

D. log x

Answer: C

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65. Find the particular solution of the differential equation $\frac{\log(dy)}{dx} = 3x + 4y$ given that $y = 0$ when $x = 0$.

A. $4e^{3x} + 3e^{-4y} + 7 = 0$

B. $4e^{3x} + 3e^{-4y} - 7 = 0$

C. $4e^{3x} + 3e^{-4y} - 7 = 0$

D. $4e^{3x} - 3e^{-4y} + 7 = 0$

Answer: C

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66. If $\frac{dy}{dx} = y + 3$ and $y(0) = 2$, then y(ln 2) is equal to

A. 7

B. 5

C. 13

D. -2

Answer: A

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67. If $\frac{dy}{dx} = 1 - y$ and y(0)=3, then $y(\log_e 8)$ is equal to

A. 5

B. $5/4$

C. 0

D. -5

Answer: B

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68. The particular solution of the differential equation $y(1+\log x)\frac{dx}{dy} - x\log x = 0$ when $x = e, y = e^2$ is

A. y=ex log x

B. ey=x log x

C. xy=e log x

D. y log x =ex

Answer: A

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69. Solution of the differential equation $\sin\left(\frac{dy}{dx}\right) = a$ with $y(0) = 1$ is

A. $\sin^{-1}\left(\frac{y-1}{x}\right) = a$

B. $\sin\left(\frac{y-1}{x}\right) = a$

C. $\sin\left(\frac{1-y}{1+x}\right) = a$

D. $\sin\left(\frac{y}{x+1}\right) = a$

Answer: B

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70. if $y = y(x)$ and $\frac{2+\sin x}{y+1}\left(\frac{dy}{dx}\right) = -\cos x, y(0) = 1,$ then $y\left(\frac{\pi}{2}\right) =$ (a) $(b)(c)(d)\frac{1}{e}3(f)(g)(h)$ (i) (b) $(j)(k)(l)\frac{2}{m}3(n)(o)(p)$ (q) (c) $(r)(s) - (t)\frac{1}{u}3(v)(w)(x)$ (y) (d) 1

A. $\frac{1}{3}$

B. $\frac{2}{3}$

C. $-\frac{1}{3}$

D. 1

Answer: A

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71. If a curve $y = f(x)$ passes through the point $(1, -1)$ and satisfies the differential equation , $y(1 + xy)dx = xdy$, then $f\left(-\frac{1}{2}\right)$ is equal to: (1) $-\frac{2}{5}$ (2) $-\frac{4}{5}$ (3) $\frac{2}{5}$ (4) $\frac{4}{5}$

A. $-\frac{4}{5}$

B. $\frac{2}{5}$

C. $\frac{4}{5}$

D. $-\frac{2}{5}$

Answer: C

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72. If a curve $y = f(x)$ passes through the point $(1, -1)$ and satisfies the differential equation , $y(1 + xy)dx = xdy$, then $f\left(-\frac{1}{2}\right)$ is equal to: (1) $-\frac{2}{5}$ (2) $-\frac{4}{5}$ (3) $\frac{2}{5}$ (4) $\frac{4}{5}$

A. $-\frac{4}{5}$

B. $\frac{2}{5}$

C. $\frac{4}{5}$

D. $-\frac{2}{5}$

Answer: A

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73. At any point on a curve , the slope of the tangent is equal to the sum of abscissa and the product of ordinate and abscissa of that point.If the curve passes through (0,1), then the equation of the curve is

A. $y = 2e^{\frac{x^2}{2}} - 1$

B. $y = 2e^{\frac{x^2}{2}}$

C. $y = e^{-x^2}$

D. $y = 2e^{-x^2} - 1$

Answer: A

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74. The general solution of the D.E. $\frac{dy}{dx} = \frac{x+y+1}{x+y-1}$ is :

A. $y = x + \log(x+y) + c$

B. $y = x^2 - \log(x+y) + c$

C. y=log (x-y)-x+c

D. y=x+log(x-y)+c

Answer: A

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75. solution of $(x+y)^2 \frac{dy}{dx} = a^2$. ('a', being a constant) is

A. $\frac{(x+y)}{a} = \tan\frac{y+c}{a}$, c is an arbitrary constant

B. xy=a tan cx , c is an arbitrary constant

C. $\frac{x}{a} = \tan\frac{y}{c}$, c is an arbitrary constant

D. $xy=\tan(x+c)$, c is an arbitrary constant

Answer: A

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76. Solution of the differential equation $(x+y-1)dx+(2x+2y-3)dy=0$ is

A. $y+x+\log(x+y-2)=c$

B. $y+2x+\log(x+y-2)=c$

C. $2y+x+\log(x+y-2)=c$

D. $2y+2x+\log(x+y-2)=c$

Answer: C

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77. The solution of the differential equation

$\frac{dy}{dx} = \frac{x - 2y + 1}{2x - 4y}$ is

A. $(x - 2y)^2 + 2x = c$

B. $(x - 2y)^2 + x = c$

C. $(x - 2y) + 2x^2 = c$

D. $(x - 2y) + x^2 = c$

Answer: A

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78. The solution of the differential equation $(2x - 4y + 3)\frac{dy}{dx} + (x - 2y + 1) = 0$ is

A. log [(2x - 4y)+3] = x - 2y+c

B. log [2(2x-4y)+3]=2(x-2y)+c

C. log[2(x-2y)+5]=2(x+y)+c

D. log[4(x-2y)+5]=4(x+2y)+c

Answer: D

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79. The solution of $\cos(x+y)dy = dx$ is

A. $\tan\left(\frac{x+y}{2}\right) = y + c$

B. $\tan\left(\frac{x+y}{2}\right) = x + c$

C. $\cot\left(\frac{x+y}{2}\right) = y + c$

D. $\cot\left(\frac{x+y}{2}\right) = x + c$

Answer: A

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80. The general solution of differential equation

$\frac{dx}{dy} = \cos(x + y)$ is

A. $\tan\left(\frac{x+y}{2}\right) = y + c$

B. $\tan\left(\frac{x+y}{2}\right) = x + c$

C. $\cot\left(\frac{x+y}{2}\right) = y + c$

D. $\cot\left(\frac{x+y}{2}\right) = x + c$

Answer: A

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81. The solution of the differential equation $\frac{dy}{dx} = \tan\left(\frac{y}{x}\right) + \frac{y}{x}$ is

A. $\cos\left(\frac{y}{x}\right) = cx$

B. $\sin\left(\frac{y}{x}\right) = cx$

C. $\cos\left(\frac{y}{x}\right) = cy$

D. $\sin\left(\frac{y}{x}\right) = cy$

Answer: B

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82. The solution of the equation $\frac{dy}{dx} = \frac{x+y}{x-y}$, is

A. $\tan^{-1}\left(\frac{y}{x}\right) = \log\sqrt{x^2+y^2} + c$

B. $\tan^{-1}\left(\frac{y}{x}\right) = \log\sqrt{x^2-y^2} + c$

C. $\sin^{-1}\left(\frac{y}{x}\right) = \log\sqrt{x^2+y^2} + c$

D. $\cos^{-1}\left(\frac{y}{x}\right) = \log\sqrt{x^2-y^2} + c$

Answer: A

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83. Show that the differential equation $\frac{dy}{dx} = \frac{y^2}{xy - x^2}$ is homogeneous and also solve it

A. $e^{y/x} = kx$

B. $e^{y/x} = ky$

C. $e^{x/y} = kx$

D. $e^{-y/x} = ky$

Answer: B

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84. The general solution of the differential equation $\left(x^2 + xy\right)y' = y^2$ is

A. $e^{\frac{y}{x}} = cx$

B. $e^{-\frac{y}{x}} = cy$

C. $e^{-\frac{y}{x}} = cxy$

D. $e^{\frac{-2y}{x}} = cy$

Answer: B

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85. The solution of the differential equ $\left(x^2 + y^2\right)dx = 2xydy$ is-

A. $x = c\left(x^2 + y^2\right)$

B. $x = c\left(x^2 - y^2\right)$

C. $x + c\left(x^2 - y^2\right) = 0$

D. None of these

Answer: B

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86. The general solution of differential equation $\frac{dy}{dx} = \frac{x + y}{x - y}$ is

A. $\log_e\left(x^2-y^2\right)+2\frac{\tan^{-1}y}{x}=c$

B. $\frac{y^2}{2}+xy=xy-\frac{x^2}{2}+c$

C. $\left(1+\frac{x}{y}\right)y=\left(1-\frac{x}{y}\right)x+c$

D. $y=x-2\log_e y+c$

Answer: A

Watch Video Solution

87. If any differentisl equation in the form

$f(f_1(x,y)d(f_1(x,y)+\phi(f_2(x,y)d(f_2(x,y))+....=0$

then each term can be intergrated separately.

For example,

$\int\sin xyd(xy)+\int\left(\frac{x}{y}\right)d\left(\frac{x}{y}\right)=-\cos xy+\frac{1}{2}\left(\frac{x}{y}\right)^2+C$

The solution of the differential equation

$xdy-ydx=\sqrt{x^2-y^2}dx$ is

A. $x+\sqrt{x^2+y^2}=cx^2$

B. $y-\sqrt{x^2+y^2}=cx$

C. $x-\sqrt{x^2+y^2}=cx$

D. $y+\sqrt{x^2+y^2}=cx^2$

Answer: D

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88. The solution of the differential equation $y\frac{dy}{dx}=x\left[\frac{y^2}{x^2}+\frac{\phi\left(\frac{y^2}{x^2}\right)}{(\phi')\left(\frac{y^2}{x^2}\right)}\right]$ is (where c is a constant)

A. $\phi\left(\frac{y^2}{x^2}\right)=cx$

B. $x\phi\left(\frac{y^2}{x^2}\right)=c$

C. $\phi\left(\frac{y^2}{x^2}\right)=cx^2$

D. $x^2\phi\left(\frac{y^2}{x^2}\right)=c$

Answer: C

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89. Solution of the differential equation $\left(1+e^{\frac{x}{y}}\right)dx+e^{\frac{x}{y}}\left(1-\frac{x}{y}\right)dy=0$ is

A. $ye^{\frac{y}{x}}+x=c$

B. $ye^{y}-x=c$

C. $ye^{\frac{x}{y}}+y=c$

D. $ye^{\frac{x}{y}}+x=c$

Answer: D

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90. Solution of the differential equation $y\cos\frac{y}{x}(xdy-ydx)+x\sin\frac{y}{x}(xdy+ydx)=0$ which satisfies $y(1)=\frac{\pi}{2}$ is

A. $y\sin\frac{y}{x}=\frac{\pi}{x}$

B. $y\sin\frac{y}{x}=\frac{\pi}{3x}$

C. $y\sin\frac{y}{x}=\frac{\pi}{2x}$

D. None of these

Answer: C

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91. The slope of the tangent at (x, y) to a curve passing through a point $(2, 1)$ is $\frac{x^2+y^2}{2xy}$, then the equation of the curve is (a) $(b)(c)2\Big((d)(e)(f)x^{(g)2(h)}(i)-(j)y^{(k)2(l)}(m)(n)\Big)=3x(o)$ (p) (b) *[Math Processing Error]* (ee) (c) $(d)(e)x\Big((f)(g)(h)x^{(i)2(j)}(k)-(l)y^{(m)2(n)}(o)(p)\Big)=6(q)$ (r) (d) $(s)(t)x\Big((u)(v)(w)x^{(x)2(y)}(z)+(aa)y^{(bb)2(cc)}(dd)(ee)\Big)=10(ff)$ (gg)

A. $2\left(x^2-y^2\right)=3x$

B. $2\left(x^2-y^2\right)=6y$

C. $x\left(x^2 - y^2\right) = 6$

D. $x\left(x^2 + y^2\right) = 10$

Answer: A

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92. Integrating factor of $x\frac{dy}{dx} - y = x^4 - 3x$ is

A. log x

B. $-x$

C. x

D. $\frac{1}{x}$

Answer: D

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93. The integrating factor of the differential equation $x.\frac{dy}{dx}+2y=x^2$ is $(x \neq 0)$

A. x^2

B. log |x|

C. $e^{\log x}$

D. x

Answer: A

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94. The integrating factor of the differential equation $\left(1+x^2\right)\frac{dy}{dx}+y=e^{\tan^{-1}x}$ is

A. $\tan^{-1}x$

B. $1+x^2$

C. $e^{\tan^{-1}x}$

D. $\log\left(1+x^2\right)$

Answer: C

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95. Integrating factor of differential equation $\cos x\frac{dy}{dx}+y\sin x=1$ is (a) $(b)(c)\cos x(d)$ (e) (b) $(f)(g)\tan x(h)$ (i) (c) $(d)(e)\sec x(f)$ (g) (d) $(h)(i)\sin x(j)$ (k)

A. cos x

B. tan x

C. sec x

D. sin x

Answer: C

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96. The integrating factor of the differential equation $\frac{dy}{dx} + y = \frac{1+y}{x}$, is

A. xe^x

B. $xe^{\frac{1}{x}}$

C. $\frac{e^x}{x}$

D. $\frac{x}{e^x}$

Answer: C

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97. The integrating factor of the differential equation $\frac{dy}{dx} = \frac{1}{x+y+2}$ is

A. e^{x+y+2}

B. e^y

C. e^{-y}

D. log |x+y+2|

Answer: C

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98. IF $\sin x$ is the integerating factor (I.F) of the linear differential equation $\frac{dy}{dx} + py = Q$ then P is

A. log sin x

B. cos x

C. tan x

D. cot x

Answer: D

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99. The solution of $\frac{dy}{dx} + P(x)y = 0$, is

A. $y = ce^{\int Pdx}$

B. $y = ce^{-\int Pdy}$

C. $y = ce^{-\int Pdx}$

D. $x = ce^{\int Pdy}$

Answer: C

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100. Find the general solution of $\frac{dy}{dx} + ay = e^{mx}$

A. $(a+m)y = e^{\mathrm{mx}} + c$

B. $ye^{\mathrm{ax}} = me^{\mathrm{mx}} + c$

C. $y = e^{\mathrm{mx}} + ce^{\text{-ax}}$

D. $(a+m)y = e^{\mathrm{mx}} + ce^{-ax}(a+m)$

Answer: D

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101. Find the general solution of each of the following differential equations:

$\frac{dy}{dx} + y = 1(y \neq 1)$

A. $\log\left|\frac{1}{1-y}\right| = x + c$

B. log |1-y| =x +c

C. log | 1 + y| =x+c

D. $\log\left|\frac{1}{1-y}\right| = -x + c$

Answer: A

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102. Solution of differential equation $x\frac{dy}{dx} = y + x^2$ is

A. $y = \log x + \frac{x^2}{2} + a$

B. $y = \frac{x^3}{3} + \frac{a}{x}$

C. $y = x^2 + ax$

D. None of these

Answer: C

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103. Find the general solution of the differential equation $x\frac{dy}{dx} + 2y = x^2(x \neq 0).$

A. $y = \frac{x^4 + C}{x^2}$

B. $y = \frac{x^2 + C}{4x^2}$

C. $y = \frac{x^4 + C}{4x^2}$

D. $y = \frac{x^2}{4} + C$

Answer: C

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104. $y + x^2 = \frac{dy}{dx}$ has the solution

A. $y + x^2 + 2x + 2 = ce^x$

B. $y + x + x^2 + 2 = ce^{2x}$

C. $y + x + 2x^2 + 2 = ce^x$

D. $y^2 + x + x^2 + 2 = ce^x$

Answer: A

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105. The solution of differential equation

$\left(1 + y^2\right) + \left(x - e^{\tan^{-1} y}\right)\frac{dy}{dx} = 0$, is

A. $xe^{\tan^{-1} y} = \tan^{-1} y + c$

B. $xe^{2\tan^{-1} y} = e^{-\tan^{-1} y} + c$

C. $2xe^{\tan^{-1}y} = e^{2\tan^{-1}y} + c$

D. $x^2e^{\tan^{-1}y} = 4e^{2\tan^{-1}y} + c$

Answer: C

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106. The solution of $\left(y - 3x^2\right)dx + xdy = 0$ is

A. $y = \sin x + \frac{1}{x^2} + c$

B. $y = \cos x - \frac{1}{x^2} + c$

C. $y = x^2 + \frac{c}{x}$

D. $y = \sqrt{x} + \frac{c}{x}$

Answer: C

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107. The solution of the equation $\left(x-4y^3\right)\frac{\mathrm{dy}}{\mathrm{dx}}-y=0,\,(y>0)$ is

A. $x+2y^3=cy$

B. $y=x^3+cx$

C. $x=y^3+cy$

D. $y+2x^3=cx$

Answer: A

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108. The solution of the differential equation $ydx+\left(x+x^2y\right)dy=0$ is

A. log y =cx

B. $-\frac{1}{xy}+\log y=c$

C. $-\frac{1}{x}+\log y=c$

D. $-\frac{1}{y}+\log y=c$

Answer: B

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109. The general solution of the DE $\frac{dy}{dx} + \frac{y}{x} = x^2$ is

A. $\frac{1}{y} = cx - x\log x$

B. $\frac{1}{x} = cy - y\log y$

C. $\frac{1}{x} = cx + x\log y$

D. $\frac{1}{y} = cx - y\log x$

Answer: B

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110. The solution of differential equation

$\cos x dy = y(\sin x - y)dx, 0 < x < \pi/2$ is

A. y tan x =sec x +c

B. tan x = (sec x +c) y

C. sec x =tan x +c) y

D. y sec x =tan x +c

Answer: C

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111. The solution of the differential equation $\left(xy^4+y\right)dx-xdy=0,$ is

A. $4x^4y^3+3x^3=cy^3$

B. $3x^3y^4+4y^3=cx^3$

C. $3x^4y^3+4x^3=cy^3$

D. None of these

Answer: C

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112. The solution of $\frac{dy}{dx} + y\tan x = \sec x$ is

A. y sec x = tan x

B. y tan x = sec x

C. tan x = y tan x

D. x sec x = tan y

Answer: A

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113. The solution of the differential equation $\frac{dy}{dx} + \frac{y}{x\log_e x} = \frac{1}{x}$, where y=1, when x=e, is

A. $2y = \log_e x + \frac{1}{\log_e x}$

B. $y = \log_e x + \frac{2}{\log_e x}$

C. $y\log_e x = \log_e x + 1$

D. $y = \log_e x + e$

Answer: A

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114. Let y(x) be the solution of the differential equation $(x \log x)\frac{dy}{dx} + y = 2x \log x, (x > 1)$. then y (e) is equal to :

A. e

B. 0

C. 2

D. 2e

Answer: C

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115. Consider the differential equation $y^2dx + \left(x - \frac{1}{y}\right)dy = 0$ if $y(1) = 1$ then x is

A. $3 - \frac{1}{y} + \frac{e^{1/y}}{e}$

B. $1 + \frac{1}{y} - \frac{e^{1/y}}{e}$

C. $1 - \frac{1}{y} + \frac{e^{1/y}}{e}$

D. $4 - \frac{2}{y} - \frac{e^{1/y}}{e}$

Answer: B

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116. Let y(x) be a solution of $\left(1 + x^2\right)\frac{dy}{dx} + 2xy - 4x^2 = 0$ and $y(0) = -1$

Then $y(1)$ is equal to

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

B. $\frac{1}{3}$

C. $\frac{1}{6}$

D. -1

Answer: C

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117. If $x(t)$ is a solution of $\frac{(1+t)dy}{dx} - ty = 1$ and $y(0) = -1$ then $y(1)$ is (a) $(b)(c) - (d)\frac{1}{e}2(f)(g)(h)$ (i) (b) $(j)(k)e + (l)\frac{1}{m}2(n)(o)(p)$ (q) (c) $(d)(e)e - (f)\frac{1}{g}2(h)(i)(j)$ (k) (d) $(l)(m)(n)\frac{1}{o}2(p)(q)(r)$ (s)

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

B. $e + \frac{1}{2}$

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

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

Answer: A

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118. Solve the differential equation $\mathrm{dy}=\cos \mathrm{x}(2\text{-}\mathrm{y}\ \mathrm{cosec}\ \mathrm{x})\mathrm{dx}$ given that $y = 2$, when $\mathrm{x}d = \frac{\pi}{2}$

A. y=sin x + cosec x

B. $y = \frac{\tan x}{2} + \frac{\cot x}{2}$

C. $y = \frac{1}{\sqrt{2}}\sec\frac{x}{2} + \sqrt{2}\cos\frac{x}{2}$

D. None of these

Answer: A

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119. Let $y'(x) + y(x)g'(x) = g(x)g'(x), y(0), x \in R,$ where $f'(x)$ denotes $\frac{dy(x)}{dx}$, and $g(x)$ is a given non-constant differentiable function on R with $g(0) = g(2) = 0$. Then the value of $y(2)$ is_____

A. 0

B. 1

C. -1

D. 2

Answer: A

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120. Let $y = g(x)$ be the solution of the differential equation $\frac{\sin(dy)}{dx} + y\cos x = 4x, x \in (0, \pi)$ If y(pi/2)=0, $then$y(pi/6)` is equal to

A. $\frac{-8}{9\sqrt{3}}\pi^2$

B. $-\frac{8}{9}\pi^2$

C. $-\frac{4}{9}\pi^2$

D. $\frac{4}{9\sqrt{3}}\pi^2$

Answer: B

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121. If $y(x)$ satisfies the differential equation $y' - y\tan x = 2x\sec x$ and

$y(0) = 0$, then (a)

$(b)(c)y\left((d)(e)(f)\frac{\pi}{g}4(h)(i)(j)\right) = (k)\frac{(l)(m)\pi^{(n)2(o)}(p)}{q}\left((r)8\sqrt{(s)2(t)(}\right.$

(y) (b) *[Math Processing Error]* (xx) (c)

$(d)(e)y\left((f)(g)(h)\frac{\pi}{i}3(j)(k)(l)\right) = (m)\frac{(n)(o)\pi^{(p)2(q)}(r)}{s}9(t)(u)(v)$

(w) (d) *[Math Processing Error]* (ddd)

A. $y\left(\frac{\pi}{2}\right) = \frac{\pi^2}{8\sqrt{2}}, y'\left(\frac{\pi}{3}\right) = \frac{4\pi}{3} + \frac{2\pi^2}{3\sqrt{3}}$

B. $y\left(\frac{\pi}{4}\right) = \frac{\pi^2}{4\sqrt{2}}, y'\left(\frac{\pi}{4}\right) = \frac{\pi^2}{18}$

C. $y\left(\frac{\pi}{3}\right) = \frac{\pi^2}{9}, y'\left(\frac{\pi}{3}\right) = \frac{4\pi}{3} + \frac{\pi^2}{3\sqrt{3}}$

D. $y\left(\frac{\pi}{3}\right) = \frac{\pi^2}{4\sqrt{2}}, y'\left(\frac{\pi}{3}\right) = \frac{\pi^2}{18}$

Answer: A

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122. The population of a city increases at the rate 3% per year. If at time t the population of city is p, then find equation of p in time t.

A. $p = \frac{3}{100}e^{3t}$

B. $p = 3e^{\frac{3t}{100}}$

C. $p = ce^{\frac{3t}{100}}$

D. $p = e^{\frac{3t}{100}}$

Answer: C

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123. Let I be the purchase value of an equipment and V(t) be the value after it has been used for t years. The value V(t) depreciates at a rate given by differential equation $\left(dV\frac{t}{dt} = -k(T-t)\right.$, where $k > 0$ is a constant and T is the total life in years of the equipment. Then the scrap value V(T) of the equipment is : (1) $T^2 - \frac{1}{k}$ (2) $I - \frac{kT^2}{2}$ (3) $I - \frac{k(T-t)^2}{2}$ (4) e^{-kT}

A. $T^2 - \frac{I}{k}$

B. $I - \frac{kT^2}{2}$

C. $I - \frac{k(T-t)^2}{2}$

D. e^{-kT}

Answer: B

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124. Let the population of rabbits surviving at a time t be governed by the differential equation $\left(dp\frac{t}{dt} = \frac{1}{2}p(t) - 200.\right.$ If $p(0) = 100$, then p(t) equals (1) $400 - 300e^{t/2}$ (2) $300 - 200e^{-t/2}$ (3) $600 - 500e^{t/2}$ (4) $400 - 300e^{-t/2}$

A. $600 - 500e^{\frac{t}{2}}$

B. $400 - 300e^{\frac{-t}{2}}$

C. $400 - 300e^{\frac{t}{2}}$

D. $300 - 200e^{\frac{-t}{2}}$

Answer: C

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Evaluation Test

1. The order of the differential equation satisfying $\sqrt{1-x^4}+\sqrt{1-y^4}=a\left(x^2-y^2\right)$ is 1 b. 2 c. 3 d. 4

A. 1

B. 2

C. 3

D. None of these

Answer: A

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2. The degree of the differential equation $\frac{d^3y}{dx^3} + x\left(\frac{dy}{dx}\right)^4 = 4\log\left(\frac{d^4y}{dx^4}\right)$ is

A. 1

B. 3

C. 4

D. Not defined

Answer: D

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3. The equation of the curve in which the portion of the tangent included between the coordinate axes is bisected at the point of contact, is

A. a parabola

B. an ellipse

C. a circle

D. a hyperbola

Answer: D

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4. The degree of the differential equation satisfying the relation $\sqrt{1+x^2}+\sqrt{1+y^2}=\lambda\left(x\sqrt{1+y^2}-y\sqrt{1+x^2}\right)$ is

A. 2

B. 3

C. 4

D. 1

Answer: D

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5. The solution of the differential equation $\frac{dy}{dx} = \frac{y}{x} + \frac{f\left(\frac{y}{x}\right)}{(f')\left(\frac{y}{x}\right)}$ is

A. $x^2 + \left(\frac{y}{x}\right) = c$

B. $y^2 + \left(\frac{y}{x}\right) = c$

C. $f\left(\frac{y}{x}\right) = cx$

D. $f\left(\frac{y}{x}\right) = cy$

Answer: C

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6. The solution of $\frac{dy}{dx} + yf'(x) - f(x).\, f'(x) = 0, y \neq f(x)$ is

A. $y = ce^{-f(x)} + f(x) - 1$

B. $y = ce^{f(x)} + f(x) - 1$

C. $y = ce^{-f(x)} + f(x) + 1$

D. $y = ce^{f(x)} + f(x) + 1$

Answer: A

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7. A function $y = f(x)$ satisfies $(x+1)f'(x) - 2\left(x^2+x\right)f(x) = \frac{e^x \hat{} 2}{(x+1)}, \forall x \succ 1.$ If $f(0) = 5,$ then $f(x)$ is (a) $(b)(c)\left((d)(e)(f)\frac{(g)3x+5}{h}((i)x+1)(j)(k)(l)\right)(m)e^n(o)(p)x^{((q)2(r))(s)}$ (w) (b) *[Math Processing Error]* (ss) (c) $(d)(e)\left((f)(g)(h)\frac{(i)6x+5}{j}((k)x+1)(l)(m)(n)\right)(o)e^p(q)(r)x^{((s)2(t))(u}$ (y) (d) *[Math Processing Error]* (uu)

A. $\left(\frac{3x+5}{x+1}\right)e^{x^2}$

B. $\left(\frac{6x+5}{x+1}\right)e^{x^2}$

C. $\left(\frac{6x+5}{(x+1)^2}\right)e^{x^2}$

D. $\left(\frac{5-6x}{x+1}\right)e^{x^2}$

Answer: B

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8. The solution of $\frac{dy}{dx} = \frac{x^2 + y^2 + 1}{2xy}$ satisfying $y(1) = 0$ is given by

A. a circle

B. a parabola

C. an ellipse

D. a hypebola

Answer: D

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9. The solution of the differential equation $xdx + ydy + \frac{xdy - ydx}{x^2 + y^2} = 0$, is

A. $y = x\tan\left(\frac{c + x^2 + y^2}{2}\right)$

B. $x = y\tan\left(\frac{c + x^2 + y^2}{2}\right)$

C. $y = x \tan\left(\frac{c - x^2 - y^2}{2}\right)$

D. None of these

Answer: C

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10. The solution of the differential equation $2x^2 y \frac{dy}{dx} = \tan\left(x^2 y^2\right) - 2xy^2$, where $y = \sqrt{\frac{\pi}{2}}$ where x =1, is

A. $\sin\left(x^2 y^2\right) = e^{x-1}$

B. $\sin\left(x^2 y^2\right) = x$

C. $\cos\left(x^2 y^2\right) + x = 0$

D. $\sin\left(x^2 y^2\right) = e.\, e^x$

Answer: A

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11. The solution of the differential equation $x^3 \frac{dy}{dx} + 4x^2 \tan y = e^x \sec y$ satisfying $y(1) = 0$, is

A. $\tan y = (x-2)e^x \log x$

B. $\sin y = e^x (x-1)x^{-4}$

C. $\tan y = (x-1)e^x x^{-3}$

D. $\sin y = e^x (x-1)x^{-3}$

Answer: B

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12. The general solution of the differential equation $\frac{dy}{dx} = y \tan x - y^2 \sec x$ is

A. tan x = (c+sec x) y

B. sec x = (c + tan y) x

C. sec x =(c + tan x) y

D. None of these

Answer: C

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13. The equation of the curve satisfying the eqution $\left(xy = x^2\right)\frac{dy}{dx} = y^2$ and passing through the point $(-1, 1)$ is

A. y= (log y-1)x

B. y=(log y+1) x

C. x=(log x -1) y

D. x=(log x+1) y

Answer: A

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14. Solution of the equation $\frac{dy}{dx} = e^{x-y}(1-e^y)$ is

A. $e^y = 1 + \frac{c}{e^x}$

B. $e^y = e^x - 1 + ce^{e^x}$

C. $e^x = e^y + 1 + ce^{e^y}$

D. None of these

Answer: D

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15. The x-intercept of the tangent to a curve is equal to the ordinate of the point of contact. The equation of the curve through the point (1,1) is

A. $ye^{\frac{x}{y}} = e$

B. $xe^{\frac{x}{y}} = e$

C. $xe^{\frac{y}{x}} = e$

D. $ye^{\frac{y}{x}} = e$

Answer: A

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16. The differential equation $\frac{dy}{dx} = \frac{\sqrt{1-y^2}}{y}$ determines a family of circles with

A. variable radii and a fixed centre (0,1)

B. variable radii and a fixed centre (0,-1)

C. fixed radius 1 and variable centres along the X-axis

D. fixed radius 1 and variable centres along the Y-axis

Answer: C

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17. Which one of the following functions is not homogeneous ?

A. f(x,y)=x[log $\sqrt{x^2+y^2}$-log y] + $ye^{\frac{x}{y}}$

B. $f(x, y) = x^{1/3}y^{-2/3}\tan^{-1}\left(\frac{x}{y}\right)$

C. $f(x, y) = x\left[\log\sqrt{x^2+y^2} - \log y\right] + ye^{\frac{x}{y}}$

D. $f(x, f) = x\left[\log\left(\frac{2x^2-y^2}{x}\right) - \log(x+y)\right] + y^2\tan\left(\frac{x+2y}{3x-y}\right)$

Answer: D

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18. A curve passes through $\left(1, \frac{\pi}{4}\right)$ and at (x, y) its slope is $\frac{\sin 2y}{x+\tan y}$.

Find the equation to the curve.

A. x=tan x

B. y =tanx

C. x=2 tan y

D. y=2 tan x

Answer: A

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19. The equation of the family of curves which intersect the hyperbola xy-2 orthogonally is

A. $y = \frac{x^3}{6} + c$

B. $y = \frac{x^2}{4} + c$

C. $y = -\frac{x^3}{6} + c$

D. $y = -\frac{x^2}{4} + c$

Answer: A

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20. Find the equation of a curve passing through $(0, 1)$ and having gradient $\frac{1(y+y^3)}{1+x+xy} at (x, y)$

A. $xy + \tan^{-1} y = \frac{\pi}{2}$

B. $xy + \tan^{-1} y = \frac{\pi}{4}$

C. $xy - \tan^{-1} y = \frac{\pi}{2}$

D. $xy - \tan^{-1} y = \frac{\pi}{4}$

Answer: B

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21. The normal to a given curve at each point (x, y) on the curve passes through the point $(3, 0)$. If the curve contains the point $(3, 4)$, find its equation.

A. $x^2 + y^2 + 6x - 7 = 0$

B. $x^2 + y^2 - 6x + 7 = 0$

C. $x^2 + y^2 - 6x - 7 = 0$

D. None of these

Answer: C

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22. Solution of the equation $xdy - \left[y + xy^3(1 + \log x)\right]dx = 0$ is :

A. $-\frac{x^2}{y^2} = \frac{2x^3}{3}\left(\frac{2}{3} + \log x\right) + c$

B. $\frac{x^2}{y^2} = \frac{2x^3}{3}\left(\frac{2}{3} + \log x\right) + c$

C. $-\frac{x^2}{y^2} = \frac{x^2}{3}\left(\frac{2}{3} + \log x\right) + c$

D. None of these

Answer: A

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23. Let f be a real-valued differentiable function on R (the set of all real numbers) such that $f(1) = 1$. If the $y - \in tercept$ of the tangent at any point $P(x, y)$ on the curve $y = f(x)$ is equal to the cube of the abscissa of P, then the value of $f(-3)$ is equal to_____

A. 3

B. 6

C. 9

D. 0

Answer: C

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24. Let I be the purchase value of an equipment and V(t) be the value after it has been used for t years. The value V(t) depreciates at a rate given by differential equation $\left(dV\frac{t}{dt} = -k(T-t)\right.$, where $k > 0$ is a constant and T is the total life in years of the equipment. Then the scrap

value V(T) of the equipment is : (1) $T^2 - \frac{1}{k}$ (2) $I - \frac{kT^2}{2}$ (3) $I - \frac{k(T-t)^2}{2}$ (4) e^{-kT}

A. $T^2 - \frac{I}{k}$

B. $I - \frac{kT^2}{2}$

C. $I - \frac{k(T-t)^2}{2}$

D. e^{-kT}

Answer: B

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25. The slope of the tangent at (x, y) to a curve passing through $\left(1, \frac{\pi}{4}\right)$ is given by $\frac{y}{x} - \cos^2\left(\frac{y}{x}\right)$, then the equation of the curve is (a) $(b)(c)y = (d)(e)\tan^{(f)(g)-1(h)}(i)\left((j)(k)\log\left((l)(m)(n)\frac{e}{o}x(p)(q)(r)\right)(s)$ (u) (v) *[Math Processing Error]* (pp) (qq) *[Math Processing Error]* (kkk) (d) none of these

A. $y = \tan^{-1}\left[\log\left(\frac{e}{x}\right)\right]$

B. $y = x \tan^{-1}\left[\log\left(\frac{x}{e}\right)\right]$

C. $y = x \tan^{-1}\left[\log\left(\frac{e}{x}\right)\right]$

D. None of these

Answer: C

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