MATHS

BOOKS - MAXIMUM PUBLICATION

DIFFERENTIAL EQUATION

Example

1. Find the differential equation satisfying $y = e^{2x}(a + bx)$,a and b are arbitrary constants.

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2. Find the differential equation satisfying $y = e^x(a\cos x + b\sin x)$,a and b are arbitrary constants..

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3. Find the differential equation satisfying $y = c_1e^x + c_2e^{-x}$,c_1 and c_2 are arbitrary constants.

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4. Form the differential equation representing the family of curve given by $(x-a)^2+2y^2=a^2$,a is a arbitrary constants.

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5. Find the equation of a curve passing through

the point (0,-2) given that at any point (x,y)

on the curve, the product of the slope of its tangent and y coordinate of the point is equal to the x coordinate of the point.

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6. Form the DE representing the family of parabolas having vertex at origin and axis along positive direction of x-axis.

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7. For the DE $xy\frac{dy}{dx} = (x+2)(y+2)$,find the solution curve passing through the point (1,-1).

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8. Solve the initial value problem:

$$\frac{dy}{dx} = y\tan 2x, y(0) = 2$$

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9. Consider the differential equation given below.

$$\frac{d^4y}{dx^4} - \sin\left(\frac{d^3y}{dx^3}\right) = 0$$

write the order and degree of the DE(if defined)

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10. Find the Differential equation satisfying the family of curves $y^2 = a\left(b^2 - x^2\right)$,a and b are arbitrary constants.

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11. Find the Differential equation satisfying the family of curves $y = ae^{3x} + be^{-2x}$,a and b are arbitrary constants.

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12. Write the order and degree of the DE

$$\left[\frac{dy}{dx}\right]^2 + \frac{dy}{dx} - \sin^2 y = 0$$

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13. Consider the equation of all circles which pass through the origin and whose centres are on the x-axis.

Define the general equation of the circle.

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14. Consider the equation of all circles which pass through the origin and whose centres are on the x-axis.

Find the DE corresponding to the above equation.

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15. Find a particular solution satisfying the given condition.

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

when $y=1, x=0$

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16. Write the degree of the DE $y' = 2xy$.

[0,1,2,3]

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17. Express $y' = 2xy$ in the form $Mdx = Ndy$ where M is a function of x and N is the function of y.

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18. Solve $y' = 2xy, y(0) = 1$

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19. Solve the following DE.

$$\frac{dy}{dx} = \frac{y^2 - x^2}{2xy}$$

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20. Solve the linear differential equation

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

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21. Choose the correct answer from the bracket.

The solution of the differential equation $xdy + ydx = 0$ represents

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22. Choose the correct answer from the bracket.

The solution of the differential equation

$xdy + ydx = 0$ represents

A. A straight line passing through origin

B. A rectangular hyperbola

C. A parabola

D. A circle whose centre is origin

Answer:

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23. Choose the correct answer from the bracket.

The solution of the differential equation $xdy + ydx = 0$ represents

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24. Choose the correct answer from the bracket.

The solution of the differential equation $xdy + ydx = 0$ represents

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25. Form the DE of the family of circles touching the x-axix at origin.

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26. Solve the DE $x^2 \frac{dy}{dx} = x^2 - 2y^2 + xy$

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27. Choose the correct answer from the bracket

The DE $\frac{dy}{dx} + \frac{y}{x} = e^x$,x>0 is of order

[0,1,2,3]

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28. Choose the correct answer from the bracket

The integrating factor of $\frac{dy}{dx} + \frac{y}{x} = e^x$,is..

A. x

B. e^x

C. -x

D. -e^x

Answer:

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29. Solve $\frac{dy}{dx} + \frac{y}{x} = e^x$

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30. Solve the DE $\frac{dy}{dx} = \frac{x+y}{x-y}$

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31. Consider the DE $\frac{dy}{dx} = \frac{y^3+3x^2y}{x^3+3xy^2}$

Identify the DE? Give reason.

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32. Consider the DE $\frac{dy}{dx} = \frac{y^3+3x^2y}{x^3+3xy^2}$

Explain the method of solving the DE.

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33. Consider the DE $\frac{dy}{dx} = \frac{y^3 + 3x^2y}{x^3 + 3xy^2}$ Solve the DE.

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34. Consider the D.E $\frac{dy}{dx} + \frac{y}{x} = x^2$

Find degree and order of DE.

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35. Consider the D.E $\frac{dy}{dx} + \frac{y}{x} = x^2$

Solve the D.E.

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36. Consider the D.E $\frac{dy}{dx} + \frac{y}{x} = x^2$

Find the particular solution when

$x = 1, y = 1$

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37. Consider the equation. $\frac{dy}{dx} + y = \sin x$

What is the order and degree of this

equation?

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38. Consider the equation. $\frac{dy}{dx} + y = \sin x$

Find the integrating factor.

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39. Consider the equation. $\frac{dy}{dx} + y = \sin x$

Solve this equation.

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40. Consider the D.E

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

Find dy/dx,degree and order of the above

differential equation.

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41. Consider the D.E

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

Find the integrating factor of the above

diffrential equation.

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42. Consider the D.E

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

the differential equation.

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43. The degree of the differential Equation

$$\frac{d^2y}{dx^2} + \cos\left(\frac{dy}{dx}\right) = 0 \text{ is}$$

A. 2

B. 1

C. 0

D. Not defined

Answer:

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44. Solve $\frac{dy}{dx} + 2y\tan x = \sin x, y = 0,$ $x = \frac{\pi}{3}$

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45. The order of the differential equation $x^4 \frac{d^2y}{dx^2} = 1 + \left(\frac{dy}{dx}\right)^3$ is

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46. Find the particular solution of the differential equation $\left(1+x^2\right)\frac{dy}{dx}+2xy=\frac{1}{1+x^2}$,when $y=0$, $x=1$.

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47. Form a differential equation of the family of circles having centre on y-axis and radius 3 units.

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48. Consider the Differential equation

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

Write the order and degree.

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49. Consider the Differential equation

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

Verify that $y = a\cos x + b\sin x$ where

a,b in R is a solution of the given DE.

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50. If $\cos x \frac{dy}{dx} + y \sin x = \tan^2 x$ is a DE,then

Find its order and degree.

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51. If $\cos x \frac{dy}{dx} + y \sin x = \tan^2 x$ is a DE,then

Find its general solution.

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52. Write the order and degree of the DE

$$\left[\frac{dy}{dx}\right]^2 + \frac{dy}{dx} - \sin^2 y = 0$$

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53. Solve the DE $\frac{dy}{dx} + 2y \tan x = \sin x$

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54. The general solution of the DE

dy/dx= e^x-y is

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

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

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

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

Answer:

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55. Solve the DE`dy/dx=2xy/(1+x^2)+x^2+2

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56. Consider the family of all circles having their centre at the point (1,2).Write the equation of the family.Write the corresponding differential equation.

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57. Write the integrating factor of the differential equation

`cosxdy/dx+y=sinx

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58. Write the order and degree of the differential equations.

$$xy\left(\frac{d^2y}{dx^2}\right)^2 + x\left(\frac{dy}{dx}\right)^3 - y\frac{dy}{dx} = 0$$

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59. Find the general solution of the differential equation $y\log ydx - xdy = 0$

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60. Find the integrating factor of the differential equation $x\frac{dy}{dx} - y = 2x^2$

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61. $y = a\cos x + b\sin x$ is the solution of the differential equation

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

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62. $y = a\cos x + b\sin x$ is the solution of the differential equation

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

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63. Verify that the function $y = a\cos x + b\sin x$ is the solution of the differential equation $\frac{d^2y}{dx^2} + y = 0$

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64. $y = a\cos x + b\sin x$ is the solution of the differential equation

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

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65. Find the solution of the differential equation $x\frac{dy}{dx} + 2y = x^2$,(x!=0) given that $y = 0$ when $x = 1$

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66. Form the DE corresponding to the

Function $y = ae^x + be^{2x}$

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67. Solve $x\frac{dy}{dx} = x + y$

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68. Form the DE corresponding to the

function $xy = c^2$

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69. Consider the DE $\left(x^2+y^2\right)dx = 2xydy$

Write the DE in the form $\frac{dy}{dx} = g\left[\frac{y}{x}\right]$

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70. Consider the DE $\left(x^2+y^2\right)dx = 2xydy$

Solve the DE completely

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71. Equation of a circle touching the y-axis at origin is $x^2 + y^2 - 2ax = 0$.Find the DE of all such circles.

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72. Solve the DE $\left(1 + x^2\right) \frac{dy}{dx} + y = \tan^{-1} x$

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73. Solution of the DE $y' - y = 0$ is $y = \ldots\ldots$

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74. Solve the DE $\frac{dy}{dx} + y \sec x = \tan x$

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75. Form the DE of the family of ellipse having foci on the x-axis and centre at the origin.

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76. Consider the DE

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

Express it in the form dy/dx=F(x,y)

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77. Consider the DE

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

Find the general solution.

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78. Prove that the DE is

$$(3xy + y^2)dx + (x^2 + xy)dy = 0$$

a homogeneous DE of degree0.

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79. Solve the DE

$$(3xy + y^2)dx + (x^2 + xy)dy = 0$$

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80. Consider the differential equation

$$\frac{dy}{dx} - 3\cot xy = \sin 2x.$$

Find its integrating factors.

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81. Consider the differential equation

$$\frac{dy}{dx} - 3\cot xy = \sin 2x.$$

Find its solution,given that $y = 2$

When $x = \frac{\pi}{2}$.

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