SHANTILAL SHAH ENGINEERING COLLEGE , BHAVNAGAR

BE Sem-II (All Branches) Mathematics-II(3110015)

Tutorial-1 Topic : First order ODE (Ex-1 to 21)

Ex-1. Solve the following first order differential equations:

(1) $3e^x \tan y dx + (1+e^x)\sec^2 y dy = 0$ (2) $xy\frac{dy}{dx} = 1 + x + y + xy$

(3) $(1+x)ydx + (1-y)xdy = 0$. (4) $(x - y^2x)dx = (y - x^2y)dy$

Ex-2 Solve $\frac{dy}{dx} = \sin(x+y) + \cos(x+y)$

Ex-3. Solve $\frac{dy}{dx} - x\tan(y-x) = 1$

Ex-4. Solve $(x^2 - y^2)dx + 2xy\,dy = 0$

Ex-5. Solve $\frac{dy}{dx} = \frac{x+2y-3}{2x+y-3}$

Ex-6. Solve $[-y^2\sin(xy) + y\cos(xy)]dx + [\cos(xy) - xy\sin(xy) + x\cos(xy)]dy = 0$

Ex-7. Solve $(x^2 - 4xy - 2y^2)dx + (y^2 - 4xy - 2x^2)dy = 0$

Ex-8 Solve $\frac{dy}{dx} + \frac{y\cos x + \sin y + y}{\sin x + x\cos y + x}$

Ex-9 Solve non exact differential equation $(x^2 + y^2)dx + xydy = 0$

Ex-10 Solve non exact differential equation $(3x^2y + 6xy + y^2)dx + (3x^2 + 2y)dy = 0$

Ex-11 Solve non exact differential equation $2xydx + (3x^2 + 2y)dy = 0$

Ex-12 Solve $\frac{dy}{dx} + 2xy = e^{-x^2}$

Ex-13 Solve $(x^2 - 1)\frac{dy}{dx} + 2xy = 1, x \neq \pm 1.$

Ex-14 Solve $(1+x^2)\frac{dy}{dx} + y = e^{\tan^{-1}x}$

Ex-15. Solve $\frac{dy}{dx} + \frac{y}{x} = y^3$.(Linear differential equation)

Ex-16. Solve $y' + y\,sinx = e^{cosx}$. .(Linear differential equation)

Ex-17 Solve following differential equations:

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

Ex-18 Solve the differential equation

(1) $y' + 2y = xy^2$,where $y(1) = 0$. (2) $y' + (x+1)y = e^{x^2}y^3, y(0) = \frac{1}{2}$.

Ex- 19 Solve the differential equations

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

(2) $xe^{-y} - p^2 = 0$

Ex-21 Find the General Solution of

(1) $(y - px)\sqrt{p^2 - 1} = p^2 + p + 1$

(2) $p^2 + 2px + 1 = \sin^{-1}p + 2y$

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