1. Show that the differential equation of family of circle touches the x-axis at the origin is $(x^2-y^2)\,dy - 2xy\,dx = 0$

2. Find the DE of the family of curves $y = e^x(A\cos x + B\sin x)$, where A and B are arbitrary constants,

3. Discuss the degree and order of the differential equation with examples.

4. Find the differential equation of all circles of radius 'a'.

5. Form a differential equation from $y = A\cos ax + B\sin ax$; A, B arbitrary constants and a is a fixed constant.

6. Find the differential equation of all circles which pass through the origin and whose centres are on the x-axis.

~~17.~~ Briefly discuss differential equation with its degree and order. Form an ordinary differential equation from $y = e^x(a\cos x + b\sin x)$; a, b parameters

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1. Define the followings:

a. Linear Differential Equation

b. Non-linear Differential equation.

2. Find the differential equation of the family of curves $y = Ae^{2x} + Be^{-2x}$ for different values of A and B.

3. Find the differential equation of the family of curves $y = e^{x}(A\cos x + B\sin x)$ where A and B are arbitrary constants.

4. By eliminating the constants a and b obtain the differential equation for which $xy = ae^{x} + be^{-x} + x^{2}$ is a solution.

5. Find the differential equation corresponding to the family of curves $y = c(x-c)^{2}$, where c is an arbitrary constant.

6. Find the differential equation of all circles of radius a

7. Show that $Ax^2 + By^2 = 1$ is the solution of $a\left\{ y\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 \right\} = y\frac{dy}{dx}$.

8. Find the differential equation of the family of curves $y = Ae^{3x} + Be^{5x}$, The different values of A and B.