$$\frac{d^2}{dx^2}(y) - 4(x)^2 = f(x,y)$$

here we have double derivative of y wrt x
y is dependent variable and x is independent variable
and both y and its derivative are in first degree
and well they are not multiplied together so
acc to my book this is LDE

but now i will try to proove its linearity by superpostion principle the one which we have been taught in earlier classes to solve whether the equations are linear or not but now i am going to apply it to differential equations to check its linearity

$f(x1,y1)= \frac{d^2}{dx^2}(y1)-4(x1)^2$

$f(x2,y2)= \frac{d^2}{dx^2}(y2)-4*(x2)^2$

that y is our dependent variable
because we always left with additional factor of 8*x1*x2 by putting x=x1+x2
since the linearity of fuction is impossible to proove by considering superpositon principle unless we think of new way to proove it : MULTI LINEARITY