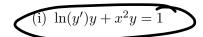
Please show and explain your work where necessary. Good luck!!

1. (3 points) Circle all of the following expression which are ordinary differential equations.





(iii)
$$\frac{x^2}{dx^3}$$
 $\frac{df}{dx} + \cos(x) - \frac{d^2f}{dx}$

(iv)
$$e^{y''} - y' + y - 1 = 0$$

$$\begin{array}{c|c} (y) & \sin \left(\frac{\partial g}{\partial x} \right) & \partial f - e^{x^2 + y^2} \\ \partial x & \partial y \end{array}$$

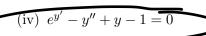
$$(vi) y^{(2)} + y' - y = 0$$

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2. (3 points) Circle all of the following expression which are linear differential equations.

(i) coldy + y = expression

(ii)
$$\sin(x)\frac{d^4f}{dx^4} + \frac{df}{dx} + x^3 + \frac{d^2f}{dx^2} = 0$$



$$(y)$$
 (y') $y = 0$

(vi)
$$g(t) \left(\frac{dg}{dt}\right) - g(t) = 0$$

Powers more than one

- 3. (3 points) State the order of the following differential equations.
 - (i) $\partial y + y = x$



firstOrder

(ii)
$$\frac{d^5g}{dt^5} - \frac{dg}{dt} + g(t) = 0$$

Order: **fifth**

(iii)
$$\left(\frac{df}{dx}\right)^3 + \frac{df}{dx} + \cos(x) = \frac{\sqrt{2}f}{dx^2}$$

Order: Secon d

(iv)
$$y''' - y' + y - 1 = 0$$

Order: thisd

(v)
$$(y')y + yx^2 = 0$$

Order: SECOA

(vi)
$$y^{(4)} - y' - y^2 = 0$$

Order: Fousth

4. (1 point) Provide an example of a nonlinear partial differential equation.

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