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problem 1 =

→ $(1-x)y'' - 4xy' + 5y = \cos x$

~~$a_2(x)$~~
$a_2(x)\, y^{(2)} + a_1(x)\, (y)' + a_0(x)\, y = g(x)$

⇒ We can say that is linear equation.

problem 2 =

⇒ $d^3y / dx^3 - (dy/dx)^4 + y = 0$

∴ $y''' = d^3y/dx^3$

∴ we can say that this equation is linear.

(3) problem = 3

$x^5y^4 - x^3\, dy/dx + 6y = 0$

this equation is linear.

(4) ~~2y'~~

problem = 4

$2y' + y = 0$

$y' + \frac{1}{2}y = 0$

$y = e^{-\int p(x)\,dx}$

$= e^{-\int 1/2\,dx}$

$= e^{-x/2}$

-> problem - 5

$$y' + 20y = 24$$

$$y' = 24 - 20y$$

$$y' = -20\left(y - 6/5\right)$$

$$\frac{dy}{dx} = -20\left(y - 6/5\right)$$

$$\frac{dy}{y - 6/5} = -20\,dx$$

take integration on both side

$$Y = y - 6/5$$

$$dY = dy$$

$$\int \frac{dY}{dY} = \int -20\,dx$$

$$\ln |Y| \Big|_{Y_0}^{Y} = -20x$$

$$\frac{y - 6/5}{y_0 - 6/5} = e^{-20x}$$

$$y = 6/5 + (y_0 - 6/5)\, e^{-20x}$$

if $y_0 = 0$

$$y = 6/5 - 6/5\, e^{-20x}$$