

Section 31.4: Linear OEs of the First order

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11:09 AM

suppose you are able to rewrite a OE into the form

$$\frac{dy}{dx} + P(x)y = Q(x)$$

↑ ↗
functions of x only

this OE is called "linear of first order"

example: Are the following linear, first-order OEs?
If so, give $P(x)$ and $Q(x)$.

a) $y' + \frac{y}{x} = x^3$ yes, with $P(x) = \frac{1}{x}$
 $Q(x) = x^3$

b) $\frac{dy}{dx} + y^2 = e^x$ no

c) $x dy + 2x^3 y dx = 3x dx$ divide by $x dx$

$\frac{dy}{dx} + 2x^2 y = 3$ yes, with $P(x) = 2x^2$
 $Q(x) = 3$

d) $(yy') + 4 = \sin x$ no

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$$e) \quad \frac{d\theta}{dt} + \theta \sin t = e^t$$

yes

with $P(t) = \sin t$

$$Q(t) = e^t$$