TUE

Name	M#

lin $y' + p y = f$

not-sep,

$p(t) = -2/t$

$v(t) = e^{\int -2/t\, dt} = e^{-2\ln(t)}$

$v(t) = e^{\ln(t^{-2})} = t^{-2}$

$\boxed{y = -t^2 e^{-t} + c t^2}$

Find the General Solution of the following ODEs

- $t y' - 2 y = t^3 e^{-t}$

$y' - 2/t\, y = t^2 e^{-t}$

$t^{-2} y' - 2 t^{-3} y = e^{-t}$

$(t^{-2} y)' = e^{-t}$

$t^{-2} y = -e^{-t} + C$

1. $t y' - 4 y = 3 t^{-2}$

$y(t) =$

$\partial M/\partial y = 4ty$ equal so exact!

$\partial N/\partial t = 4ty$

$M dt + N dy = 0$

- $(1 + 2 t y^2) dt + (2 y + 2 t^2 y + 3 y^2) dy = 0$ aka $y' = -(1 + 2 t y^2)/(2 y + 2 t^2 y + 3 y^2)$

$\partial s/\partial t = 1 + 2ty^2 \Rightarrow s = t + t^2y^2 + h(y) \Rightarrow \partial s/\partial y = 0 + 2t^2y + h'(y) = 2y + 2t^2y + 3y^2$

so $h'(y) = 2y + 3y^2 \Rightarrow h(y) = y^2 + y^3$

Gen sol is ~~[illegible]~~

$\boxed{t + t^2y^2 + y^2 + y^3 = C}$

2. $y' = -\frac{2t+y}{t+3y^2}$