Workshop 3 #4B

Tuesday, September 22, 2020 1:53 PM

4. Solve the following initial value problems.

(a) $(x^{-1} + 2y^2x)dx + (2yx^2 - \cos(y))dy, \quad y(1) = \pi.$

(b) $(e^t y + te^t y)dt + (te^t + 2)dy, \quad y(0) = -1.$

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B.) $M = \frac{d}{dy}(e^t y + te^t y) \qquad N = \frac{d}{dt}(te^t + 2)$

$M = e^t + te^t \qquad N = e^t + te^t$ ✓

$N(y)\, y' = M(t)$

$e^t y + te^t y + (te^t + 2)y' = 0$

$(te^t + 2)y' = -y(e^t + te^t)$

$\frac{y'}{y} = -\frac{e^t + te^t}{te^t + 2}$

$\frac{1}{y}y' = -\frac{e^t(t+1)}{te^t + 2}$

$\ln(x) = -\ln(te^t + 2) + c_1$

$y = \frac{c_1}{te^t + 2}$

$y = -\frac{2}{te^t + 2}$

$-1 = \frac{c_1}{2}$

$c_1 = -2$