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Madison Truemner **QUIZ 2** 1/26/2018

1. $xy' - y = x^2e^x$

$y' - \frac{1}{x}y = xe^x$ (2')

$i(x) = e^{-\int \frac{1}{x}dx} = e^{-\ln x} = x^{-1}$ (3')

$y'x^{-1} - \frac{1}{x^2}y = e^x$

$\frac{d}{dx}(yx^{-1}) = \frac{d}{dx}(e^x)$ (2')

$yx^{-1} = e^x + c_1$

$\boxed{y = xe^x + c_1x}$ (3')

$\rightarrow y' = xe^x + e^x + c_1$

$xe^x + e^x + c_1x - y = x^2e^x$?

$y' - x^{-1}y = xe^x$

$i(x) = e^{\int -x^{-1}dx} = e^{-\ln x} = e^{\ln x^{-1}} = x^{-1}$

$\int \frac{-1}{x} = -\ln x$

2. $y' = \frac{3(x+1)^2}{y}$, $y(-1) = 2 \rightarrow$ find $y(0)$

$\frac{dy}{dx} = \frac{3(x+1)^2}{y}$

$\int (x+1)^2 dx$ Let $u = x+1$, $du = dx$

$y\,dy = 3(x+1)^2dx$ (3')

$\frac{1}{2}y^2 = 3\left[\frac{1}{3}(x+1)^3 + c_1\right]$

$\frac{1}{2}y^2 = (x+1)^3 + 3c_1$ (2')

$\frac{1}{2}(2)^2 = (0) + 3c_1$

$\frac{1}{2}(4) = 3c = 2 \rightarrow c = \frac{2}{3}$ (2')

$\frac{1}{2}y^2 = (x+1)^3 + 2$

$y^2 = 2(x+1)^3 + 4$

$y = \pm\sqrt{2(x+1)^3 + 4}$

$\frac{1}{2}y(0)^2 = (1)^3 + 2$

$\frac{1}{2}(y(0))^2 = 3$

$y(0)^2 = 6$ (2')

$\boxed{y(0) = \sqrt{6}}$