ENG272 Exam #1, Fall 2015

bernoulli

7. **Using an appropriate substitution,** solve the differential equation $y' = -y + xy^5$.

$n = 5$

$y' + y = xy^5$

Substitute $u = y^{1-n} = y^{-4}$

Bernoulli N° $u = y^{-4}$, $y = u^{-4}$

$y' = -4u^{-5}\frac{du}{dx}$

watch exponents!

$-4u^{-5}\frac{du}{dx} + u^{-4} = xu^{-20}$

$-\frac{1}{4}u^{5}\left[-4u^{-5}\frac{du}{dx} + u^{-4} = xu^{-20}\right] = \frac{du}{dx} - \frac{1}{4}u = -\frac{1}{4}xu^{-15}$

$\frac{du}{dx} = -\frac{1}{4}xu^{-15} + \frac{1}{4}u$