Review:

Wednesday, April 12, 2017 1:59 PM

Solve $\frac{dy}{dx} + 2xy^2 = 0$. Give an explicit solution.

Separable:

$$\frac{dy}{dx} = -2xy^2$$

$$\int \frac{dy}{y^2} = \int -2x\,dx$$

$$-y^{-1} = -x^2 + C$$

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

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

Solve the following, giving an explicit solution.

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

$$x\,dy + 2y\,dx = 3x^2\,dx$$

$$dy + \frac{2}{x}y\,dx = 3x\,dx$$

$$IF = e^{\int P(x)\,dx}$$

$$= e^{\int \frac{2}{x}\,dx}$$

$$= e^{2\ln x} = e^{\ln x^2}$$

$$= x^2$$

$$x^2\,dy + 2xy\,dx = 3x^3\,dx$$

$$\int d(x^2 y) = \int 3x^3\,dx$$

$$x^2 y = \frac{3}{4}x^4 + C$$

$$y = \frac{3x^2}{4} + \frac{C}{x^2}$$

Integrate: $\int x^2 e^{3x}\,dx$

LIATE

D	I	
x^2	e^{3x}	(+)
$2x$	$\frac{1}{3}e^{3x}$	(−)
2	$\frac{1}{9}e^{3x}$	(+)
0	$\frac{1}{27}e^{3x}$	

$$\int x^2 e^{3x} = \frac{1}{3}x^2 e^{3x} - \frac{2}{9}x e^{3x} + \frac{2}{27}e^{3x} + C$$