(1) $$\frac{dy^3}{d^3x} + 4x^2y' - (x-1)y = xy^{5/2}$$

Problema 2

(2) $A_0 = 1\,kg$ $\qquad 800g * \frac{1k}{1000g} = 0.8\,kg$

$A_3 = 0.8\,kg$ $\qquad 50g * \frac{1k}{1000} = 0.05\,kg$

$A = Ce^{-kt}$

$A = e^{-kt}$

$0.8 = e^{-k(3)} \rightarrow \ln(0.8) = 3k$

$\frac{\ln(0.8)}{3} = k \rightarrow -0.07$

$A = e^{-0.07t} \rightarrow \frac{1}{2} = e^{-0.07t}$

$\ln(0.5) = -0.07t$

$\frac{\ln(0.5)}{-0.07} = t$

(1) $\boxed{9.90 = t}$

$0.05 = e^{-0.07t} \rightarrow \frac{\ln(0.05)}{-0.07} = t$

(2) $\boxed{42.79 = t}$

Problema 4

4 $T_A = 85°F$ $T = 325°$ 5 mil

$T_5 = 250°F$

$$\frac{dT}{(T-85)} = k\,dt$$

$$T = Ce^{-kt} + 85$$

$$325 = C + 85$$

$$240 = C \rightarrow T = 240e^{-kt} + 85$$

$$\frac{250-85}{240} = e^{k5}$$

$$\ln\frac{11}{16} = k5 \rightarrow \frac{\ln\left(\frac{11}{16}\right)}{5} = K$$

$$K = -0.07$$

$$T = 240e^{-0.07t} + 85$$

1

$$T = 240e^{-0.07(20)} + 85 = 144.18F°$$

$$\frac{275-85}{240} = e^{-0.07t}$$

$$\ln\left(\frac{19}{24}\right) = t$$

$$\frac{275-85}{240} = e^{-0.07t}$$

$$\frac{\ln\left(\frac{19}{24}\right)}{-0.07} = t$$

$3.34 = t\,\text{min}$ 2

Problema 5

$$\frac{dy}{dx} = x(1-2y) \qquad y(0) = 2.5$$

$$\frac{dy}{1-2y} = x\,dx \rightarrow \int \frac{dy}{1-2y} = \int x\,dx$$

$u = 1-2y$
$du = -2\,dy$
$\frac{du}{-2} = dy$

$$-\frac{1}{2}\int \frac{1}{u}\,dy = \frac{x^2}{2} + C$$

$$-\frac{1}{2}\ln(u) + C = \frac{x^2}{2} + C$$

$$-\frac{1}{2}\ln(1-2y) = \frac{x^2}{2} + C$$

$$\ln(1-2y) = -x^2 - 2C$$

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

$$1-2(2.5) = C$$

$$-4 = C \qquad \rightarrow -2y = -4e^{-x^2} - 1$$

$$C = 2$$

$$y = 2e^{-x^2} + 1/2$$

$$y = 2e^{-(3)^2} + \frac{1}{2} = 0.50$$

La costante de integración es 2.

El valor de y cuando x vale 3 es 0.50

80

$\frac{dy}{dt} + 2xy = x$ $\qquad$ $y(0) = 2.5$

Problema 5

utilizando sustitución.

$e^{\int 2x\, dt} \rightarrow e^{x^2}$

$e^{x^2}\frac{dy}{dt} + e^{x^2} 2xy = e^{x^2} x$

$\frac{d}{dx}(e^{x^2} y) = e^{x^2} x$

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

$u = x^2$

$du = 2x\, dx$

$\frac{du}{2x} = dx$

$e^{x^2} y = \int e^{u} \cancel{x} \frac{du}{2\cancel{x}} =$

$= \frac{1}{2}\int e^{u} du \rightarrow \frac{1}{2} e^{u}$

$y = \frac{\frac{1}{2} e^{x^2} + c}{e^{x^2}} \rightarrow y = \frac{1}{2} + c e^{-x^2}$

$2.5 = \frac{1}{2} + C$

$\underbrace{2 = C}$

$y = \frac{1}{2} + 2 e^{-(3)^2} \rightarrow \underline{0.500}$