

$$m(120+2t)^3 =$$

RAKARAKA

$$2t^4 + 480t^3 + 43200t^2 + 1728000t - \\ \cos t (120+2t)^3 + 6 \sin t (120+2t)^2 + C$$

$$m = \frac{(2t^4 + 480t^3 + 43200t^2 + 1728000t) - \cos t + 6 \sin t + C}{(120+2t)^3}$$

$$\frac{6 \sin t}{(120+2t)} + \frac{C}{(120+2t)^3}$$

$$\text{at } t=0$$

$$m = 150$$

$$150 = 50 \left(-1 + \frac{C}{(120)^3} \right)$$

$$150 = -50 + \frac{50C}{120^3}$$

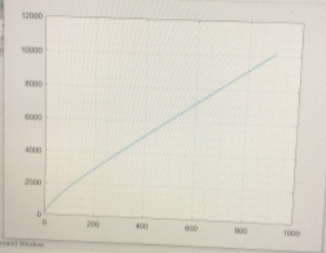

$$C = 518399$$

$$\therefore m = \frac{(2t^4 + 480t^3 + 43200t^2 + 1728000t) - \cos t + 6 \sin t + 518399}{(120+2t)^3}$$

$$+ \frac{518399}{(120+2t)^3}$$

Figure 1

File Edit View Insert Tools Desktop Window Help



Command Window

440.0000 440.5000 441.0000 441.5000 442.0000 442.5000 443.0000 443.5000

Column 992 through 901

445.5000 446.0000 446.5000 447.0000 447.5000 448.0000 448.5000 449.0000

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practice.m X practice2.m X practice3.m X practice4.m X practice5.m yimaassignment.m* X Untitled2.m X sym.m X +
1 - commandwindow
2 - clear all
3 - clc
4 - syms m(t) t
5 - eqn = diff(m,t)+ 3*m(t)/(120+2*t) == (50*(1+sin(t)))
6 - s = dsolve(eqn,m(0)==150)
7 - y=simplify(s)
8 - t=0:0.5:450
9 - plot(subs(y,t))
10 - grid on
11 - grid minor
12 - xlabel('Time(min)')
13 - ylabel('Amount of Salt(Lb)')
14
15
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Command Window

```
440.0000 440.5000 441.0000 441.5000 442.0000 442.5000 443.0000 443.5000 444.0000 444.5000 445.0000
Columns 892 through 901
445.5000 446.0000 446.5000 447.0000 447.5000 448.0000 448.5000 449.0000 449.5000 450.0000
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fx

CHEMICAL ENGINEERING

$$(a) \frac{dm}{dt} = \dot{m}_a - \dot{m}_{out}$$

$$\dot{m}_a = 50 \times (1 + \sin t)$$

$$\dot{m}_{out} = 30 \times \left(\frac{m}{1200 + 20t} \right)$$

$$\frac{dm}{dt} = 50(1 + \sin t) - \frac{3m}{120 + 2t}$$

$$\frac{dm}{dt} + \frac{3m}{120 + 2t} = 50(1 + \sin t)$$

Using I.F

$$\frac{dy}{dx} + Py = Q$$

$$P = \frac{3}{120 + 2t}, \quad Q = 50(1 + \sin t)$$

$$\int P dt = \frac{3}{2} \ln(120 + 2t)$$

$$I.F = e^{\int P dt} = e^{\frac{3}{2} \ln(120 + 2t)} = (120 + 2t)^{\frac{3}{2}}$$

$$I.F = (120 + 2t)^{\frac{3}{2}}$$

$$y \cdot I.F = \int Q \cdot I.F dx$$

$$m(120 + 2t)^{\frac{3}{2}} = 50 \int (120 + 2t)^{\frac{3}{2}} (1 + \sin t) dt$$