

Sayangnya Kemampuan Otomatis
Diferensial
Markus

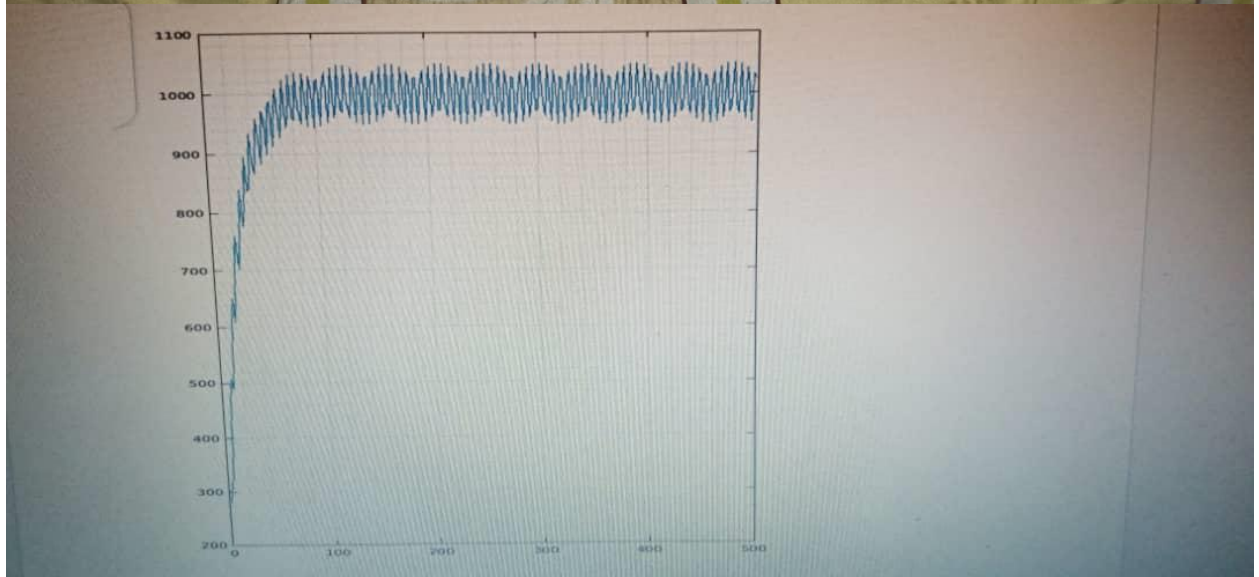
100 $\frac{dm}{dt} = m - a$ and
 (no amount of salt)
 $a = 50 \text{ gal} \times \frac{1 \text{ liter}}{1000 \text{ gal}}$
 $m = 50(1 \text{ liter}) \frac{dt}{\text{min}}$
 $a = 50 \text{ gal} \times 0.025$
 12000 gal
 $= 2.5 \text{ liter/min}$
 $\frac{dm}{dt} = -0.025m + (50 + 50 \text{ ml})$
 $\frac{dm}{dt} = -0.025m + 100$
 $\frac{dm}{dt} = -0.025(m - 2000)$
 $m = 2000 - 2000e^{-0.025t}$
 $\frac{dm}{dt} = -0.025(m - 2000)$
 Differential eqn, $\frac{dm}{dt} = (50 + 50 \text{ ml})$
 $\Rightarrow \frac{dm}{dt} = -0.025m + (50 + 50 \text{ ml})$

$\frac{dy}{dt} + y = Q$ $Q = 50 + 50 \text{ ml}$
 $P = 0.025$
 $IF = e^{\int P dt} = e^{0.025t}$
 $y \cdot IF = \int Q \cdot IF dt$
 $m \cdot e^{0.025t} = \int (50 + 50 \text{ ml}) e^{0.025t} dt$
 Integrating RHS
 $\int (50 + 50 \text{ ml}) e^{0.025t} dt = \int 100 e^{0.025t} dt$
 $u = 100 e^{0.025t}$
 $du = 2.5 e^{0.025t} dt$
 $\frac{1}{2.5} du = 40 e^{0.025t} dt$
 $\int 40 e^{0.025t} dt = \frac{1}{0.025} \times 40 e^{0.025t}$
 $= 1600 e^{0.025t}$
 $y \cdot IF = 1600 e^{0.025t} + C$
 $y = \frac{1600 e^{0.025t} + C}{e^{0.025t}}$
 $y = 1600 e^{-0.025t} + C e^{-0.025t}$
 $1600 e^{-0.025t} + C e^{-0.025t} = 100$
 $1600 + C = 100 e^{0.025t}$
 $C = 100 e^{0.025t} - 1600$
 $y = 1600 e^{-0.025t} + (100 e^{0.025t} - 1600) e^{-0.025t}$
 $y = 1600 e^{-0.025t} + 100 - 1600 e^{-0.025t}$
 $y = 100$
 $m = 100$

Let $u = 100 e^{0.025t}$
 $du = 2.5 e^{0.025t} dt$
 $\frac{1}{2.5} du = 40 e^{0.025t} dt$
 $\int 40 e^{0.025t} dt = \frac{1}{0.025} \times 40 e^{0.025t}$
 $= 1600 e^{0.025t}$
 $y \cdot IF = 1600 e^{0.025t} + C$
 $y = \frac{1600 e^{0.025t} + C}{e^{0.025t}}$
 $y = 1600 e^{-0.025t} + C e^{-0.025t}$
 $1600 e^{-0.025t} + C e^{-0.025t} = 100$
 $1600 + C = 100 e^{0.025t}$
 $C = 100 e^{0.025t} - 1600$
 $y = 1600 e^{-0.025t} + (100 e^{0.025t} - 1600) e^{-0.025t}$
 $y = 1600 e^{-0.025t} + 100 - 1600 e^{-0.025t}$
 $y = 100$
 $m = 100$

(a) $y = 100$
 (b) $y = 100$
 (c) $y = 100$
 (d) $y = 100$
 (e) $y = 100$
 (f) $y = 100$
 (g) $y = 100$
 (h) $y = 100$
 (i) $y = 100$
 (j) $y = 100$
 (k) $y = 100$
 (l) $y = 100$
 (m) $y = 100$
 (n) $y = 100$
 (o) $y = 100$
 (p) $y = 100$
 (q) $y = 100$
 (r) $y = 100$
 (s) $y = 100$
 (t) $y = 100$
 (u) $y = 100$
 (v) $y = 100$
 (w) $y = 100$
 (x) $y = 100$
 (y) $y = 100$
 (z) $y = 100$

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```
commandwindow
clear
close all

r = []
t = 0:1:500

y_mean = 1000 - (800*exp(-0.05*t))
y = 1000 + 50/1.0025*sin(t) + 50 * 0.05/1.0025*cos(t) - 802.49*exp(-0.05*t)

if rem(t, 2) == 0
    r = [r, ymean]
else
    r = [r, y]
end

x = transpose(r)
time = transpose(t)

plot(t, r, 'green')
grid on
Command Window
```