ERNEST-OKOLI ROMEO
18/ENG07/004
Petroleum Engineering
ENGINEERING MATHS

(1a) $\frac{dy}{dt} = y_{in} - y_{out}$

$\frac{dy}{dt} = 50(1 + \sin t) - 2.5\% \text{ of } y$

$\frac{dy}{dt} = 50(1 + \sin t) - 0.025y$

$\frac{dy}{dt} + 0.025y = 50(1 + \sin t)$

multiply by dt

$1 + 0.025y\, dy = 50(1 + \sin t)\, dt$

(1b) $\frac{dy}{dt} = 50(1 + \sin t) - 0.025y$

$\therefore \frac{dy}{dt} + 0.025y = 50(1 + \sin t)$

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

$\therefore P = 0.025, Q = 50(1 + \sin t)$

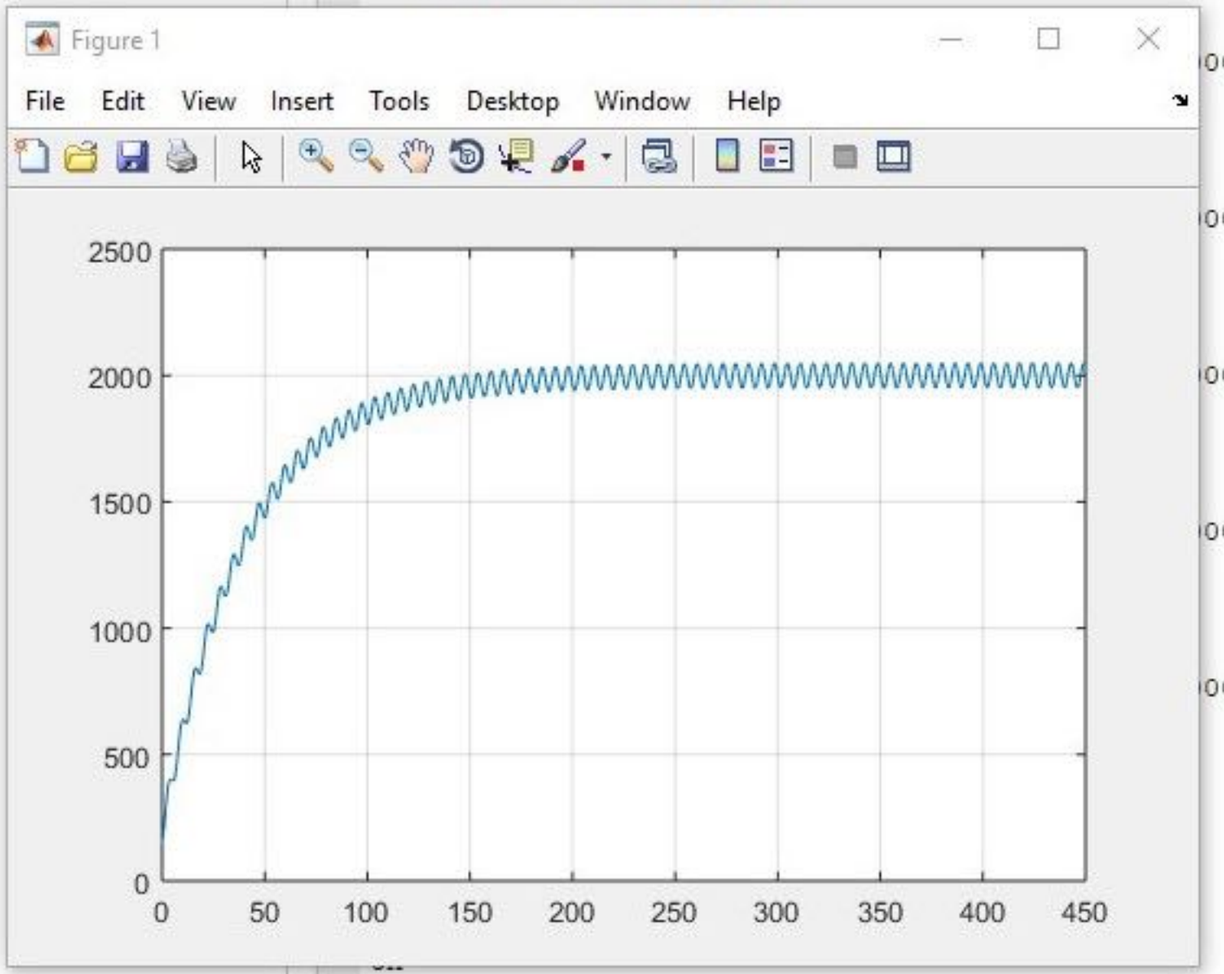
$\int P \cdot dt = 0.025t$

$I.f = e^{\int P \cdot dt}$

$I.f = e^{0.025t}$

$y \cdot I.f = \int Q\, I.f \cdot dt$

```
commandwindow
clear
clc
close all
syms m t
ans=dsolve('Dm+0.025*m=50+50*sin(t)','m(0)=150')
t=0:0.5:450
tn=subs(ans,t)
plot(t,tn)
grid on
```

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Columns 876 through 880

[ 150, 2000 - (2000*1601^(1/2)*cos(atan(1/40) + 1/2))/1
>>
```