

OKPODU JESSICA

18/ENG07/010

PETROLEUM ENGR

ENG 282 200VL

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Question 1

Tank contains 1200g of water

150lb of salt

50 gal of brine

30 gal per minute

Each gallon contains  $(1 + \sin t)$  gal of salt

$$\text{min} = \frac{50 \text{ gal}}{\text{min}} \times \frac{(1 + \sin t) \text{ lb}}{\text{gal}}$$

% Content of tank of salt per minute

$$= \frac{36}{1200} \times 100$$

$$= 2.5\%$$

$$\% \text{ salt in } \sin t = 0.025y$$

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

$$\frac{dm}{dt} = 50 + 50 \sin t - 0.025y$$

$$\frac{dm}{dt} = -0.025(y - 2000 - 2000 \sin t)$$

$$\frac{1}{(y-2000-2000\sin t)} dy = \int -0.025 dt$$

$$\ln(y-2000-2000\sin t) = -0.025t + C$$

$$(y-2000-2000\sin t) = e^{-0.025t} \times e^C$$

$$(y-2000-2000\sin t) = y \times e^{-0.025t}$$

$$t=0$$

$$y=150$$

$$150-2000-2000\sin(0) = y \times e^{-0.025 \times 0}$$

$$150-2000 = y$$

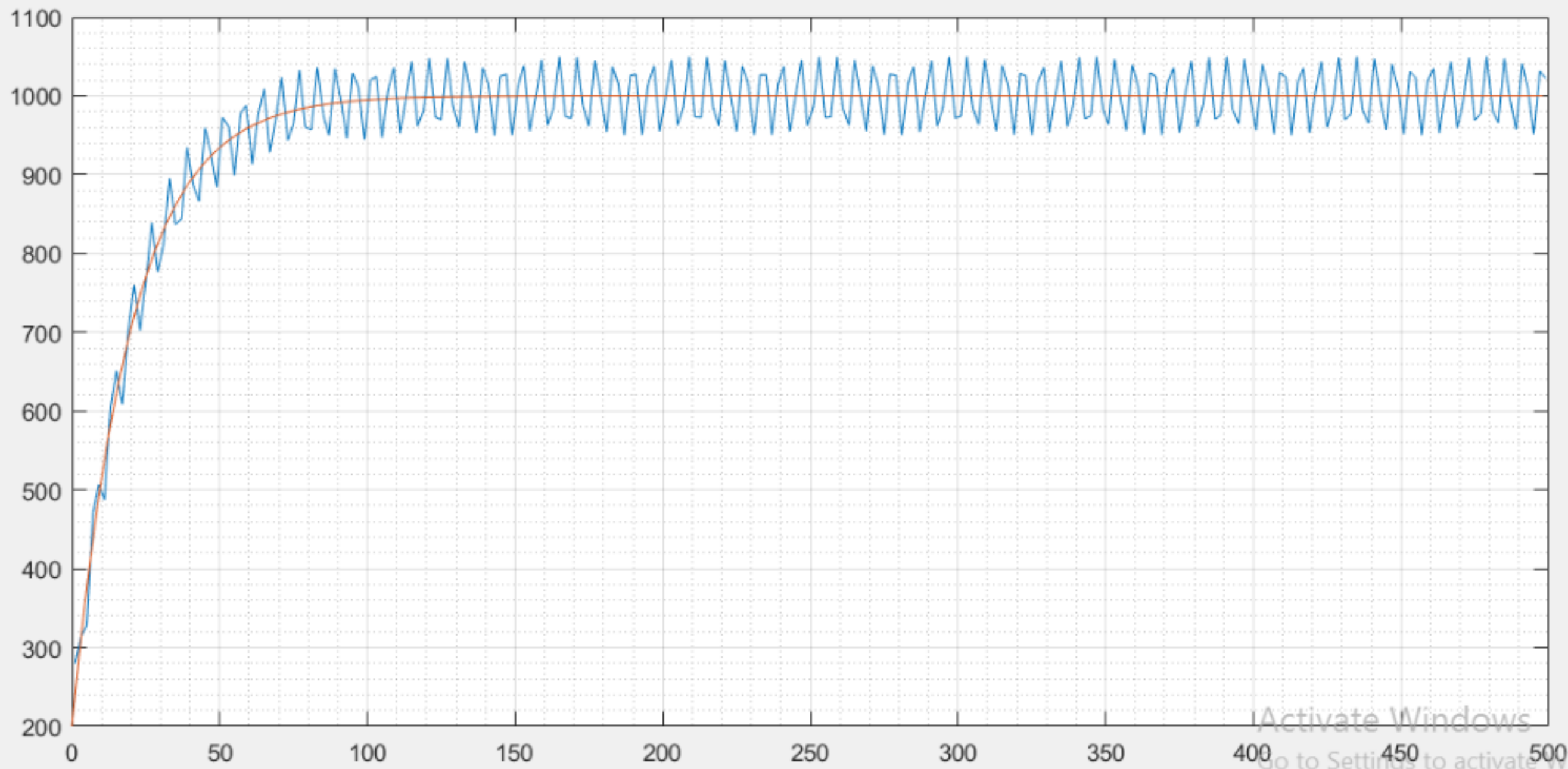
$$y = -1850$$

$$y = 2000(1 + \sin t) - 1850 e^{-0.025t}$$

```
1 - commandwindow
2 - clear
3 - clc
4 - close all
5 - format short g
6 - syms t
7 - y=(50/0.05)+((50/1.0025)*sin(t))+((50*0.05/1.0025)*cos(t))-(802.49*exp(-0.05*t))
8 - ym=1000-(800*exp(-0.05*t))
9 - t=0:1:500
10 - t1=t(2:2:500)
11 - t2=t(1:2:500)
12 - Y=subs(y,t1)
13 - Ym=subs(ym,t2)
14 - mdata={'t(min)', 'V(litres)';Y,Ym}
15 - plot(t1,Y,t2,Ym)
16 - grid on
17 - grid minor
18
19
```

Activate Windows

Go to Settings to activate Windows.



Activate Windows  
Go to Settings to activate windows.

```

>> syms m t
    eqn = dsolve('Dm = (50*(1+sin(t)))-
    (0.025*m)', 'm(0) = 150')
    t = 0:(0.5/60):7.5
    m = subs(eqn, t)
    plot(t, m, 'green')
    xlabel('time(hrs)')
    ylabel('Amount of substance (lb)')
    grid on
    grid minor

...
01^(1/2)*cos(atan(1/40) + 79/24))/
1601 - (2881850*exp(-79/960))/1601,
2000 - (2000*1601^(1/2)*cos(atan(1/40)
+ 33/10))/1601 -
(2881850*exp(-33/400))/1601, 2000
- (2000*1601^(1/2)*cos(atan(1/40)
+ 397/120))/1601 -
(2881850*exp(-397/4800))/1601, 2000
- (2000*1601^(1/2)*cos(atan(1/40)
+ 199/60))/1601 -
(2881850*exp(-199/2400))/1601, 2000
- (2000*1601^(1/2)*cos(atan(1/40)
+ 133/40))/1601 -
(2881850*exp(-133/1600))/1601, 2000
- (2000*1601^(1/2)*cos(atan(1/40) +
10/3))/1601 - (2881850*exp(-1/12))/1601,
2000 - (2000*1601^(1/2)*cos(atan(1/40)
+ 401/120))/1601 -
(2881850*exp(-401/4800))/1601, 2000
- (2000*1601^(1/2)*cos(atan(1/40)
+ 67/20))/1601 -
(2881850*exp(-67/800))/1601, 2000
- (2000*1601^(1/2)*cos(atan(1/40)

```

```

>> t = 1:2:500
y=1000+((50/1.0025)*sin(t))+
((50*0.05)/1.0025)*cos(t)-
(802.49*exp(-0.05*t))
ta = 0:2:500
ya=1000-(800*exp(-0.05*ta))
plot(t, y)
hold on
plot(ta, ya)
hold off
xlabel('amount')
ylabel('time(min)')
grid on
grid minor

```

t =

Columns 1 through 6

1 3 5 7 9 11

Columns 7 through 12

13 15 17 19 21 23

Columns 13 through 18

25 27 29 31 33 35

Columns 19 through 24

37 39 41 43 45 47

Columns 25 through 30