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Contains 1200 gal

Dissolves initially at 150lb

There are 50 gal each flowing per minute

hence = 50gal/min

Each gal contain $[1+\sin t]$ lb

And leaves at 30 gal/min.

y_{in} = gal/min × lb

$y_{in} = 50 \times [1+\sin t] = 50[1+\sin t]$

Since it contains 1200gal and 30gals leave per min.

hence

$y_{out} = \frac{30}{1200} = 0.025$ of the tank cont. content

∴ 0.025 present in the tank would also leave the tank per minute

hence $y_{out} = 0.025 \times y$

where y = tank remaining

$\therefore y_{out} = 0.025y$

$\frac{dy}{dt} = y_{in} - y_{out}$

$\frac{dy}{dt} = 50[1-\sin t] - 0.025y$

$$\frac{dy}{dt} = -0.025\{y - 2000\{1+\sin t\}\}$$

$$\int \frac{dy}{[y-2000[1+\sin t]]} = -0.025 dt \int$$

$$\ln\{y-2000[1+\sin t]\} = \int -0.025 dt$$

$$\ln\{y-2000[1+\sin t]\} = -0.025t + C$$

$$\therefore y-2000[1+\sin t] = e^{-0.025t} e^{C}$$

note $e^{C} = y_0$

$$\therefore y-2000[1+\sin t] = y_0 e^{-0.025t}$$

$$\therefore y = y_0 e^{-0.025t} + 2000\{1+\sin t\}$$

Given when $t = 0 \min$ $y = 150 lb$ initially.

$$150 = y_0 e^{-0.025(0)} + 2000\{1+\sin 0\}$$

$$150 = y_0\{1\} + 2000$$

$$-y_0 = 2000 - 150 = 1850 \quad y_0 = -1850$$

$$\frac{dy}{dt} = -0.025\{y - 20$$

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

Documents ▸ MATLAB ▸

Editor - C:\Users\Emmanuel Wonighan\Documents\MATLAB\Untitled.m

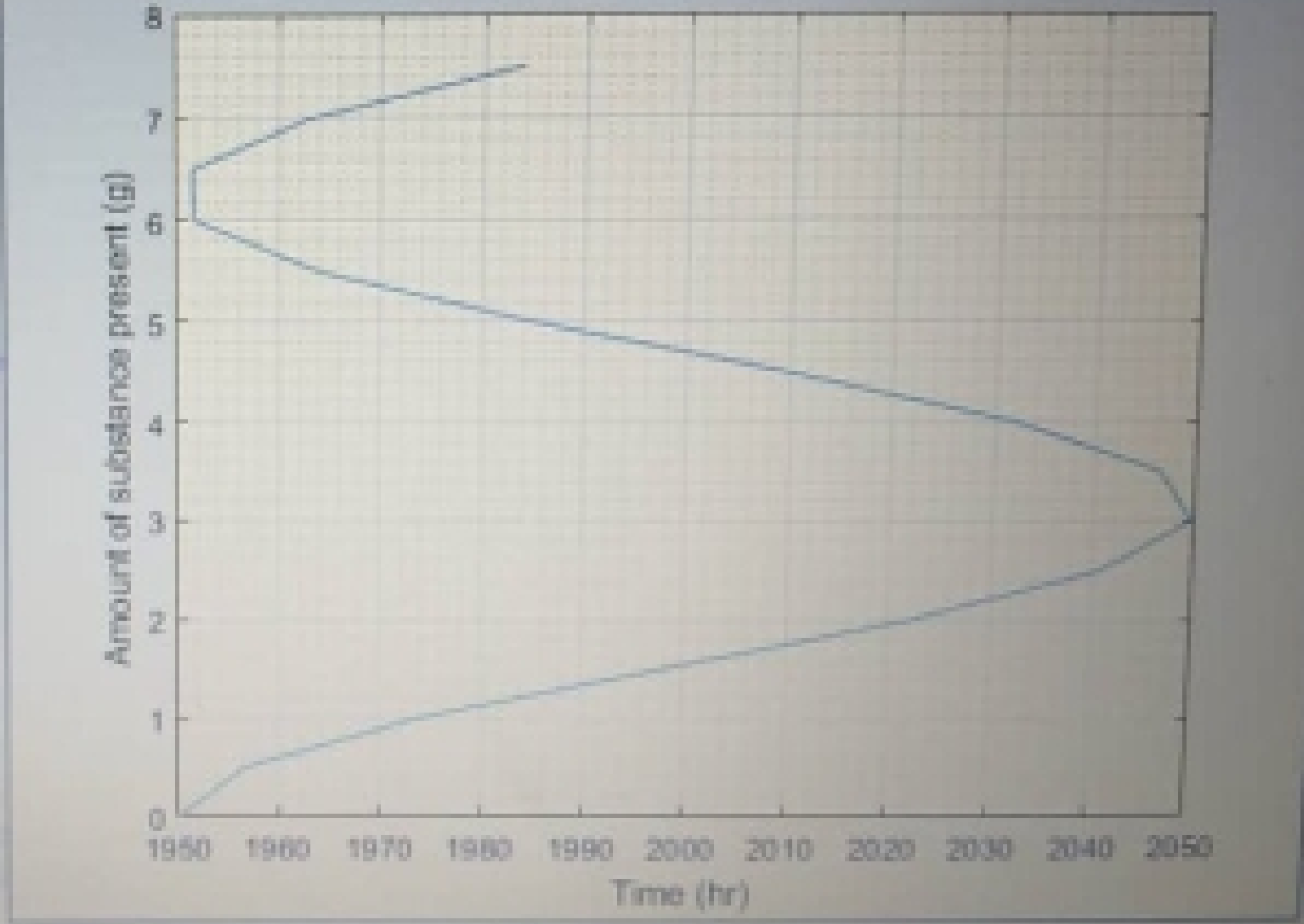
Untitled.m

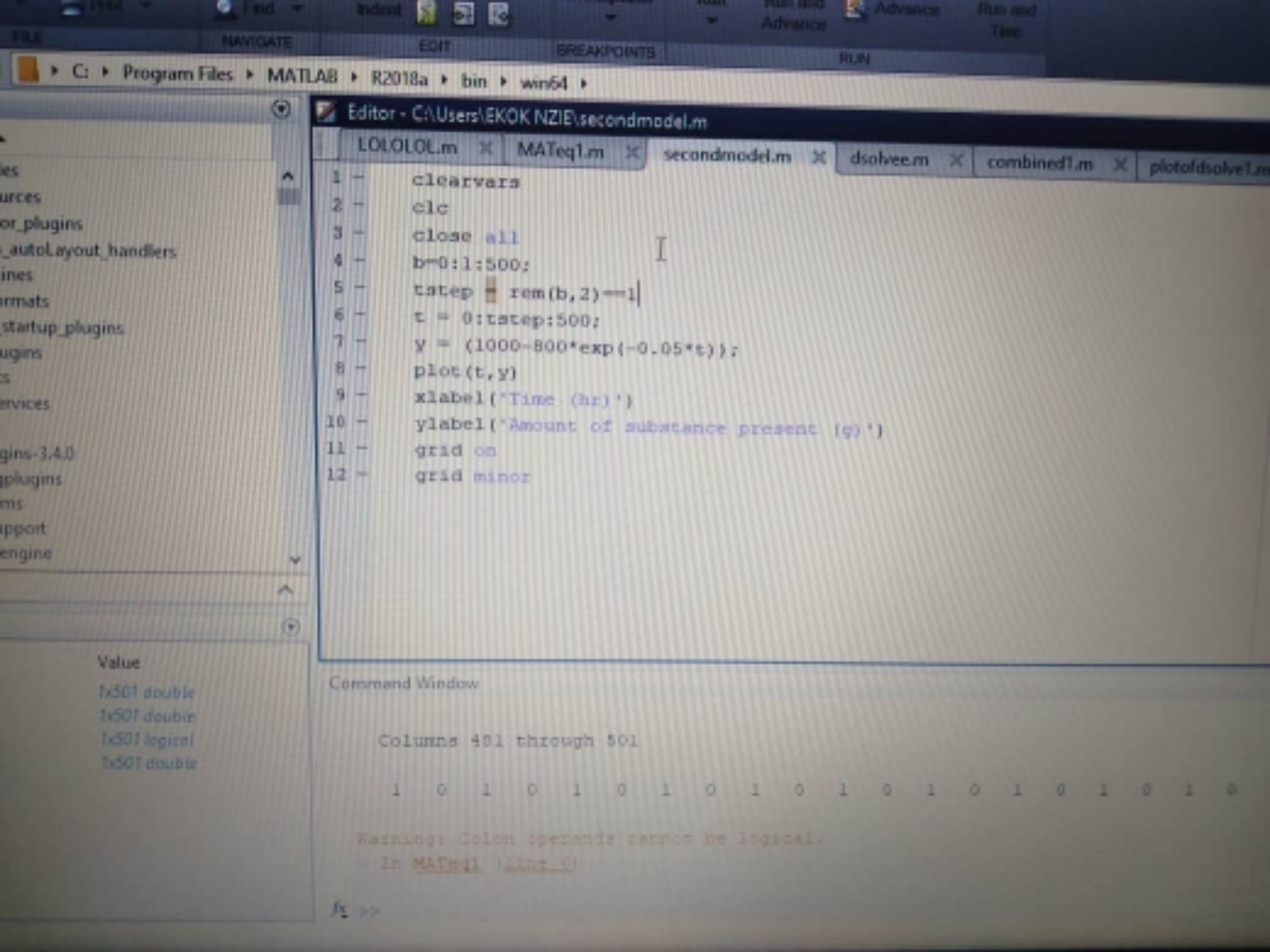
```
commandwindow
clear
clc
close all
clear vars
y=dsolve('Dy=50*(sin(t)+1)-0.025*y','t')
t=[0:0.5:7.5]
ezplot(y,t)
grid on
grid minor
xlabel('time')
ylabel('amount of substances')
```

Command Window

```
y =

C5*exp(-t/40) - (2000*1601^(1/2)*cos(t + atan(1/40)))/1601 + 2000


t =

  Columns 1 through 5

         0    0.5000    1.0000    1.5000    2.0000

  Columns 6 through 10

    2.5000    3.0000    3.5000    4.0000    4.5000

  Columns 11 through 15

    5.0000    5.5000    6.0000    6.5000    7.0000

  Column 16

    7.5000

fx >>
```

File Edit View Insert Tools Desktop Window Help




C: ▸ Program Files ▸ MATLAB ▸ R2018a ▸ bin ▸ win64 ▸
Editor - C:\Users\EKOK NZIE\secondmodel.m
LOLOLOL.m
MATeq1.m
secondmodel.m
dsolvee.m
combined1.m
plotofdsolve1.m
1 clearvars
2 clc
3 close all
4 b=0:1:500;
5 tstep = rem(b,2)==1
6 t = 0:tstep:500;
7 y = (1000-800*exp(-0.05*t));
8 plot(t,y)
9 xlabel('Time (hr)')
10 ylabel('Amount of substance present (g)')
11 grid on
12 grid minor
Command Window
Columns 481 through 501
1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1
Warning: Colon operands cannot be logical.
> In MATeq1 (line 6)
fx >>
Value
1x501 double
1x501 double
1x501 logical
1x501 double

NAVIGATE EDIT BREAKPOINTS RUN

C: ▸ Program Files ▸ MATLAB ▸ R2018a ▸ bin ▸ win64 ▸

Editor - C:\Users\EKOK NZIE\Desktop\MATeq1.m

LOLOLOL.m | MATeq1.m | secondmodel.m | dsolvee.m | combined1.m | plotofdsolve1.m

```
1 -  clc
2 -  close all
3 -  clearvars
4 -  b=0:1:500;
5 -  tstep = rem(b,2)==0
6 -  t = 0:tstep:500;
7 -  x =((1000)+(49.88)*(sin(t))+(2.49)*(cos(t))-802.49*exp(-0.05*t));
8 -  plot(t,x)
9 -  xlabel('Time (hr)')
10 -  ylabel('Amount of substance present (g)')
11 -  grid on
12 -  grid minor
```

Value
1x501 double
1x501 double
1x501 logical
1x501 double

Command Window

```
  Columns 481 through 501

    1   0   1   0   1   0   1   0   1   0   1   0   1   0   1   0   1   0   1   0   1

Warning: Colon operands cannot be logical.
> In MATeq1 (line 5)
```

fx >>

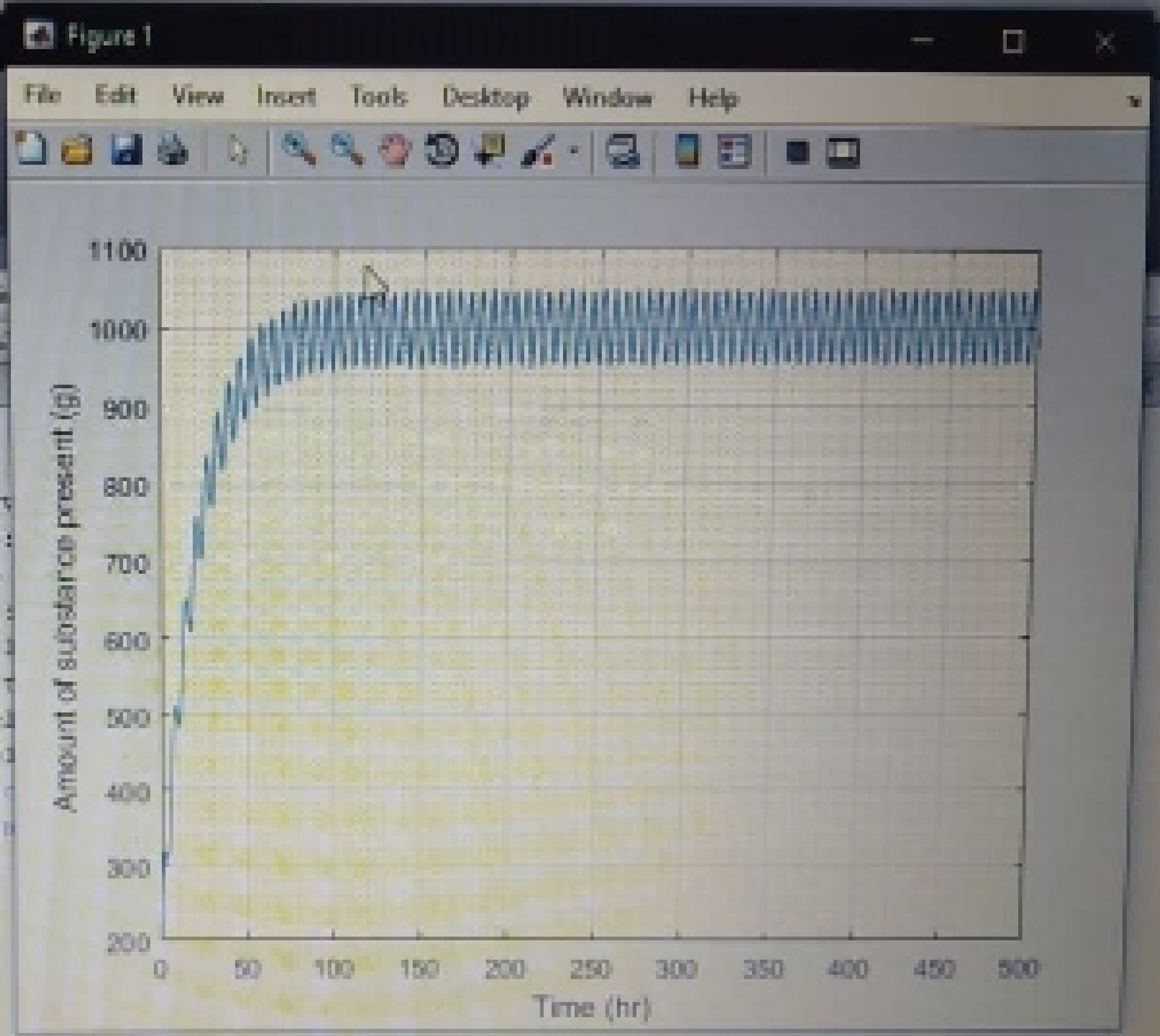


Figure 1
File Edit View Insert Tools Desktop Window Help
1100
1000
900
800
700
600
500
400
300
200
Amount of substance present (g)
0 50 100 150 200 250 300 350 400 450 500
Time (hr)