①

Date / /
Page No.

# MEC232

Name : Rohan Kumar Saini
Roll No : RM2041A01
Reg No : 12011878

---

1. Define the variable t as t = 3.2 ; then evaluate :

a) $\frac{1}{2} e^{2t} - 3.81t^3$

b) $\frac{6t^2 + 6t - 2}{t^2 - 1}$

Soln =

```
t = 3.2;
a = (e^(2*t))/2 -3.81*t^3
b = (6*t^2 +6*t -2)/(t^2 -1)
```

---

a = 176.08
b = 8.5108

---

3. Create the following matrix by typing one command. Do not use elements explicitly.

G =

| | | | | |
|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 |

Soln =

```
G = [ones(3,5) ; zeros(2,3) ones(2,2)]
```

②

C =

| | | | | |
|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 1 | 1 |

---

5. A 70 lb-bag of rice is being pulled by a person by applying a force F at an angle θ as shown. The force required to drag the bag is given by:

$$F(\theta) = \frac{70\mu}{\mu \sin\theta + \cos\theta}$$

where $\mu = 0.35$ is the friction coefficient.

a) Determine $F(\theta)$ for $\theta = 5^\circ, 10^\circ, 15^\circ, 20^\circ, 25^\circ, 30^\circ$ and $35^\circ$.

b) Determine the angle θ where F is minimum.

Sol$^n$ =

```
mu = 0.35;
theta = [5 10 15 20 25 30 35]
F1 = (70*mu)/(mu*sind(theta(:,1)) + cosd(theta(:,1)));
F2 = (70*mu)/(mu*sind(theta(:,2)) + cosd(theta(:,2)));
F3 = (70*mu)/(mu*sind(theta(:,3)) + cosd(theta(:,3)));
F4 = (70*mu)/(mu*sind(theta(:,4)) + cosd(theta(:,4)));
F5 = (70*mu)/(mu*sind(theta(:,5)) + cosd(theta(:,5)));
F6 = (70*mu)/(mu*sind(theta(:,6)) + cosd(theta(:,6)));
F7 = (70*mu)/(mu*sind(theta(:,7)) + cosd(theta(:,7)));
F = [F1 F2 F3 F4 F5 F6 F7]
plot(theta, F)
MinF = min(F)
```

---

theta =

5 10 15 20 25 30 35

③

Date / /
Page No.

F =

23.863 23.432 23.190 23.126 23.240 23.534 24.022

Min F = 23.126

Octave

File Edit Debug Window Help News

Current Directory: and Stastical Method Laboratory\CA1\CA1

Editor

File Edit View Debug Run Help

CA1.m

```
%Name: Rohan Kumar Saini
%Roll Number:RM2041A01
%Registration Number:12011878
%Question1
t=3.2;
a=(e^(2*t))/2-3.81*t^3
b=(6*t^2+6*t-2)/(t^2-1)

%Question3
G=[ones(3,5);zeros(2,3) ones(2,2)]

%Question5
mu=0.35;
theta=[5 10 15 20 25 30 35]
F1=(70*mu)/(mu*sind(theta(:,1))+cosd(theta(:,1)));
F2=(70*mu)/(mu*sind(theta(:,2))+cosd(theta(:,2)));
F3=(70*mu)/(mu*sind(theta(:,3))+cosd(theta(:,3)));
F4=(70*mu)/(mu*sind(theta(:,4))+cosd(theta(:,4)));
F5=(70*mu)/(mu*sind(theta(:,5))+cosd(theta(:,5)));
F6=(70*mu)/(mu*sind(theta(:,6))+cosd(theta(:,6)));
F7=(70*mu)/(mu*sind(theta(:,7))+cosd(theta(:,7)));
F=[F1 F2 F3 F4 F5 F6 F7]
plot(theta,F)
MinF=min(F)
```

line: 1 col: 1 encoding: SYSTEM (CP1252) eol: CRLF

Command Window Documentation Variable Editor Editor

Octave

File Edit Debug Window Help News

Current Directory: C:\Rohan\Octave

Command Window

```
>> CA1

a = 176.08
b = 8.5108
G =

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

theta =

    5   10   15   20   25   30   35

F =

   23.863   23.432   23.190   23.126   23.240   23.534   24.022

MinF = 23.126
>>
```

Command Window | Documentation | Variable Editor | Editor

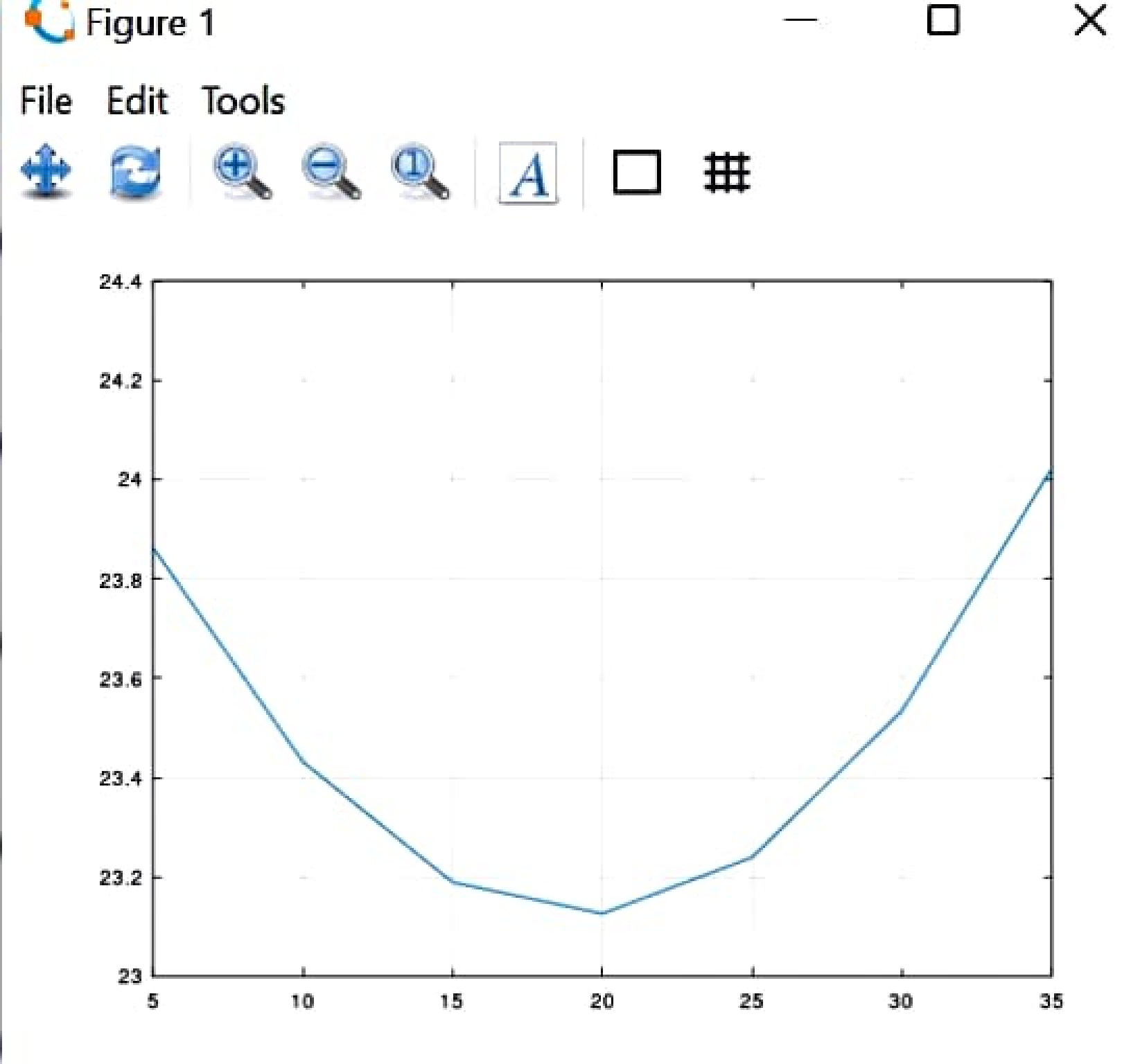
Figure 1
File Edit Tools
24.4
24.2
24
23.8
23.6
23.4
23.2
23
5
10
15
20
25
30
35