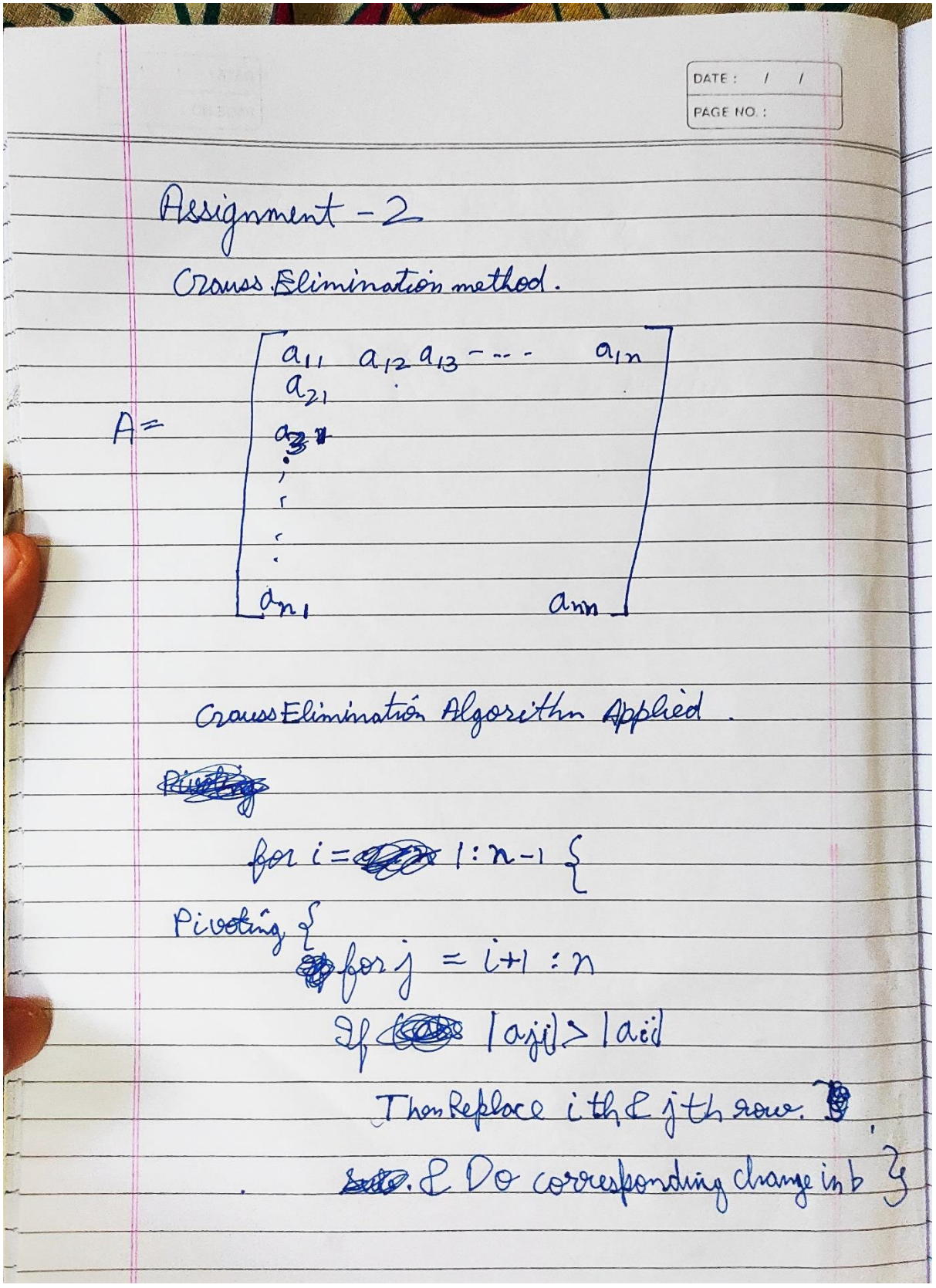
Assignment 2

200020038

To use gauss elimination method to solve system of linear equations.



Assignment - 2

Crauss Elimination method.

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} & \cdots & a_{1n} \\ a_{21} & & & & \\ a_{31} & & & & \\ \vdots & & & & \\ a_{n1} & & & & a_{nn} \end{bmatrix}$$

Crauss Elimination Algorithm Applied.

for i = 1 : n-1 {

Pivoting {

for j = i+1 : n

If |ajj| > |aii|

Then Replace ith & jth row.

& Do corresponding change in b }

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Row subtraction

for $j = i+1 : n$ {
factor = $A(j,i) / A(i,i)$
Row j − factor × Row i
& do corresponding with b; }

return A & b

Back Substitution.

$$\begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ 0 & a_{22} & \cdots & a_{2n} \\ 0 & 0 & & \vdots \\ 0 & 0 & & \vdots \\ \vdots & \vdots & & \vdots \\ 0 & \vdots & & \vdots \\ 0 & 0 & \cdots & a_{nn} \end{bmatrix}$$

Let $n \times 1$ array x

for $i = 1 : n$ $\Rightarrow$ $b(n+1-i) - \sum_{j=1}^{i-1} a_{n-(i+1),\, n-j}\, x(n-j)$
{ val = $b(n+1, i)$
$j = i$
while $j > 1$
{ val = val − $A(n+1-i, n+2-j) \times x(n+2-j)$
$j = j - 1$ }
val = val / $A(n+1-i, n+1-i)$

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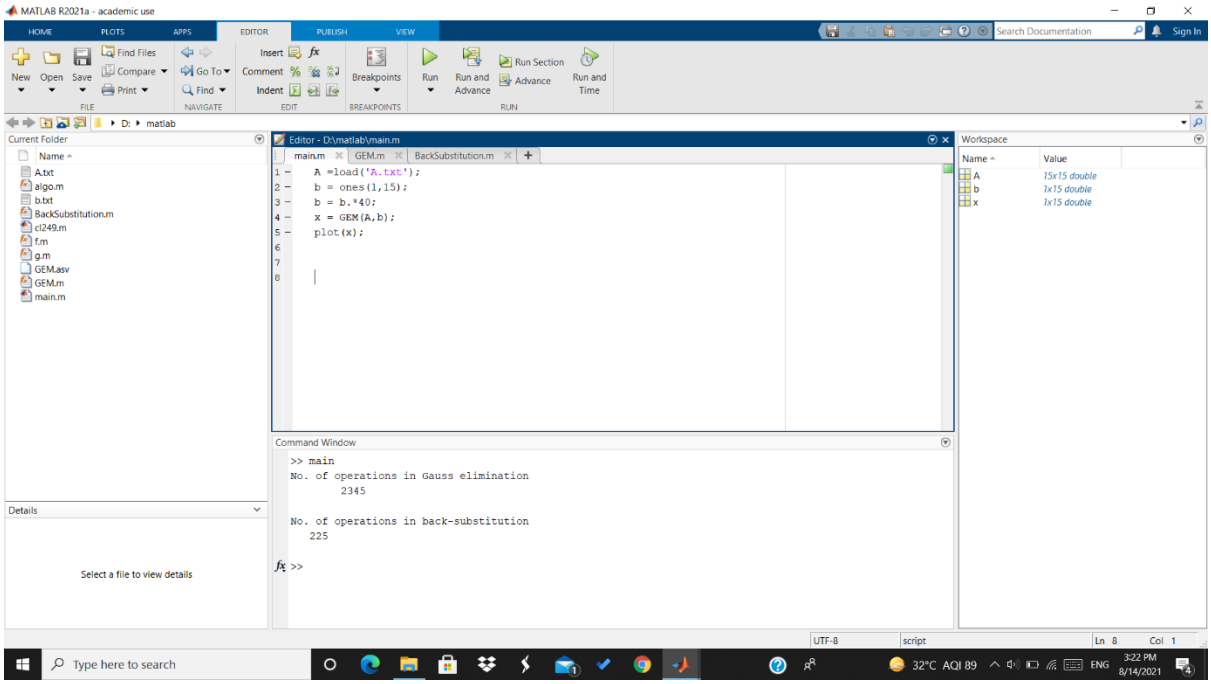
x(n+1-i) = val.

}

return x

// here x is solution.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D: matlab
Current Folder
Name
A.txt
algo.m
b.txt
BackSubstitution.m
cl249.m
f.m
g.m
GEM.asv
GEM.m
main.m
Details
Select a file to view details
Editor - D:\matlab\main.m
main.m
GEM.m
BackSubstitution.m
1 - A =load('A.txt');
2 - b = ones(1,15);
3 - b = b.*40;
4 - x = GEM(A,b);
5 - plot(x);
6
7
8
Command Window
>> main
No. of operations in Gauss elimination
2345
No. of operations in back-substitution
225
fx >>
Workspace
Name
Value
A
15x15 double
b
1x15 double
x
1x15 double
UTF-8
script
Ln 8
Col 1
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ENG
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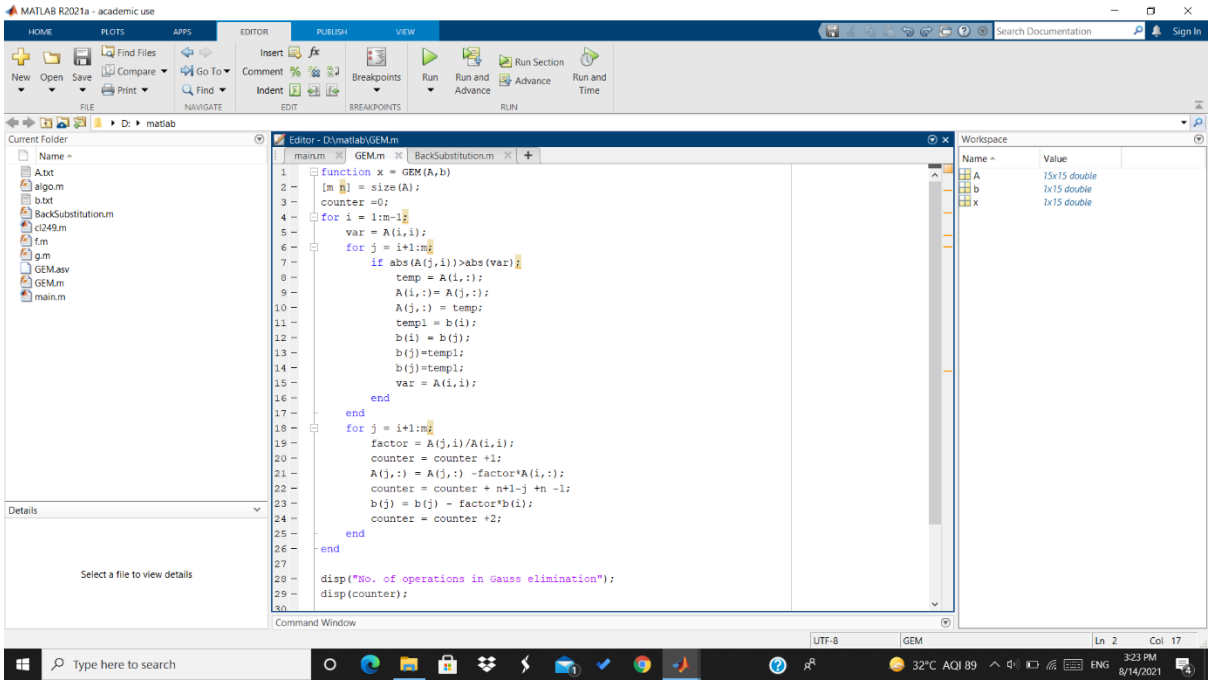
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algo.m
b.txt
BackSubstitution.m
cl249.m
f.m
g.m
GEM.asv
GEM.m
main.m
Details
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Editor - D:\matlab\GEM.m
main.m
GEM.m
BackSubstitution.m
function x = GEM(A,b)
[m n] = size(A);
counter =0;
for i = 1:m-1;
var = A(i,i);
for j = i+1:m;
if abs(A(j,i))>abs(var);
temp = A(i,:);
A(i,:)= A(j,:);
A(j,:) = temp;
temp1 = b(i);
b(i) = b(j);
b(j)=temp1;
b(j)=temp1;
var = A(i,i);
end
end
for j = i+1:m;
factor = A(j,i)/A(i,i);
counter = counter +1;
A(j,:) = A(j,:) -factor*A(i,:);
counter = counter + n+1-j +n -1;
b(j) = b(j) - factor*b(i);
counter = counter +2;
end
end
disp("No. of operations in Gauss elimination");
disp(counter);
Command Window
Workspace
Name
Value
A
15x15 double
b
1x15 double
x
1x15 double
UTF-8
GEM
Ln 2
Col 17
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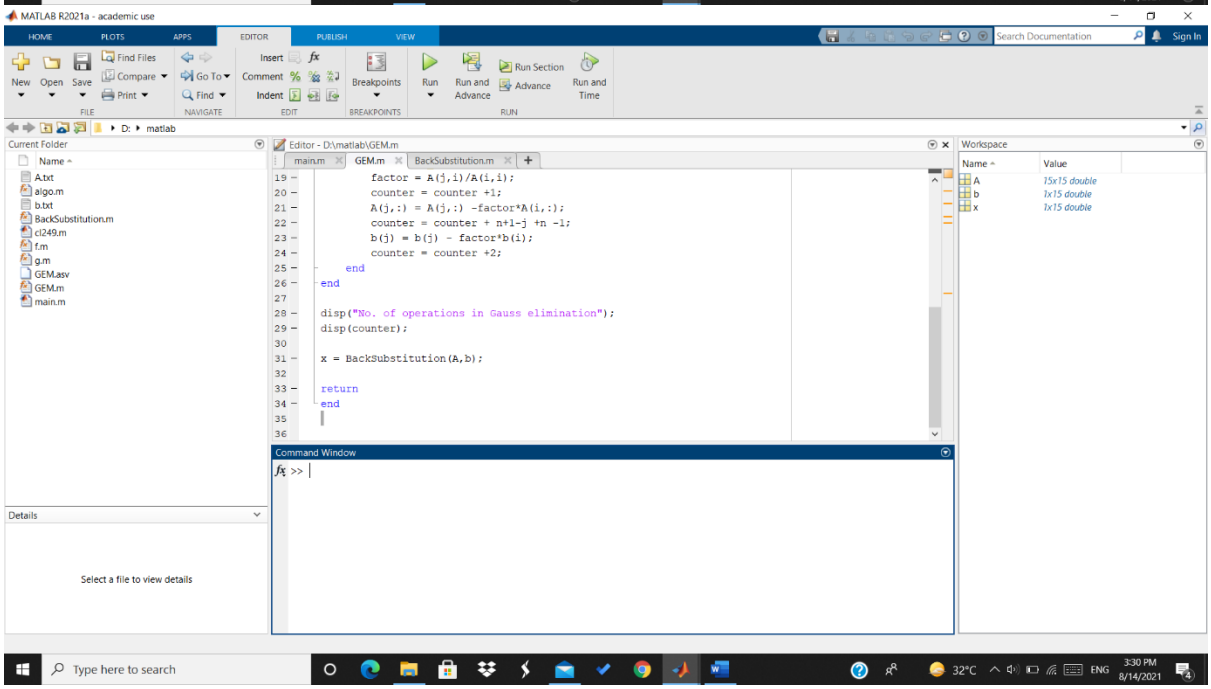
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algo.m
b.txt
BackSubstitution.m
cl249.m
f.m
g.m
GEM.asv
GEM.m
main.m
Details
Select a file to view details
Editor - D:\matlab\GEM.m
main.m
GEM.m
BackSubstitution.m
factor = A(j,i)/A(i,i);
counter = counter +1;
A(j,:) = A(j,:) -factor*A(i,:);
counter = counter + n+1-j +n -1;
b(j) = b(j) - factor*b(i);
counter = counter +2;
end
end
disp("No. of operations in Gauss elimination");
disp(counter);
x = BackSubstitution(A,b);
return
end
Command Window
>>
Workspace
Name
Value
A
15x15 double
b
1x15 double
x
1x15 double
Type here to search
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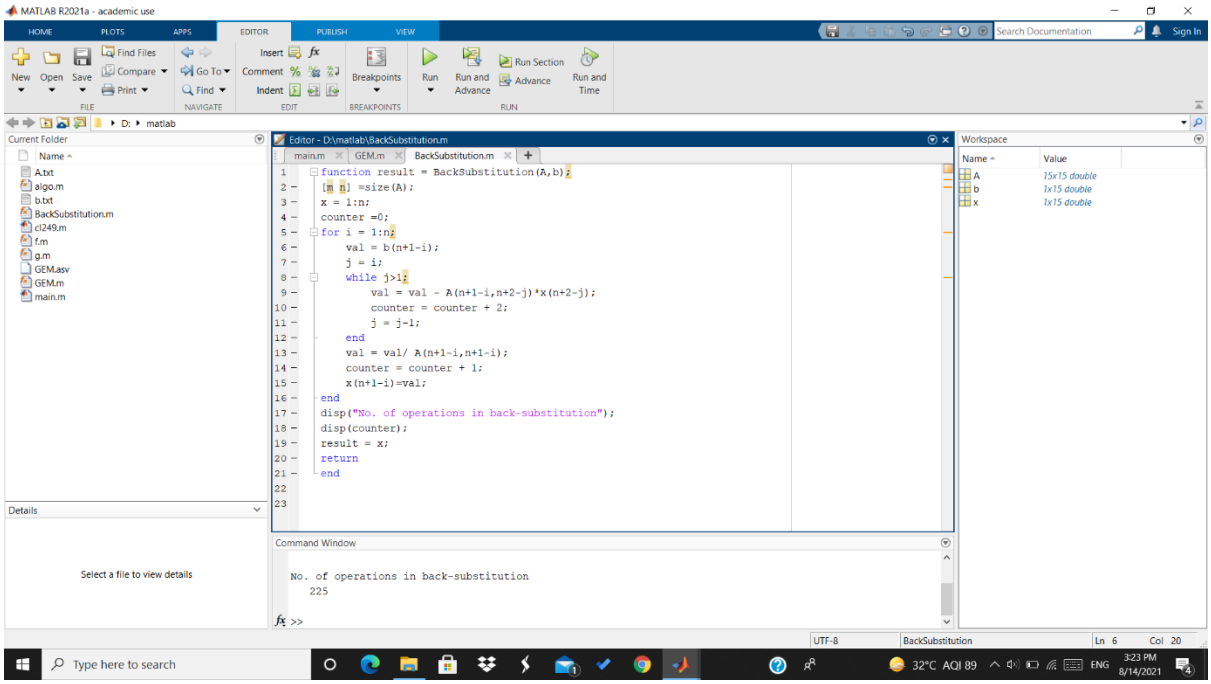
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cl249.m
f.m
g.m
GEM.asv
GEM.m
main.m
Details
Select a file to view details
Editor - D:\matlab\BackSubstitution.m
main.m
GEM.m
BackSubstitution.m
function result = BackSubstitution(A,b);
[n n] =size(A);
x = 1:n;
counter =0;
for i = 1:n;
val = b(n+1-i);
j = i;
while j>1;
val = val - A(n+1-i,n+2-j)*x(n+2-j);
counter = counter + 2;
j = j-1;
end
val = val/ A(n+1-i,n+1-i);
counter = counter + 1;
x(n+1-i)=val;
end
disp("No. of operations in back-substitution");
disp(counter);
result = x;
return
end
Workspace
Name
Value
A
15x15 double
b
1x15 double
x
1x15 double
Command Window
No. of operations in back-substitution
225
>>
UTF-8
BackSubstitution
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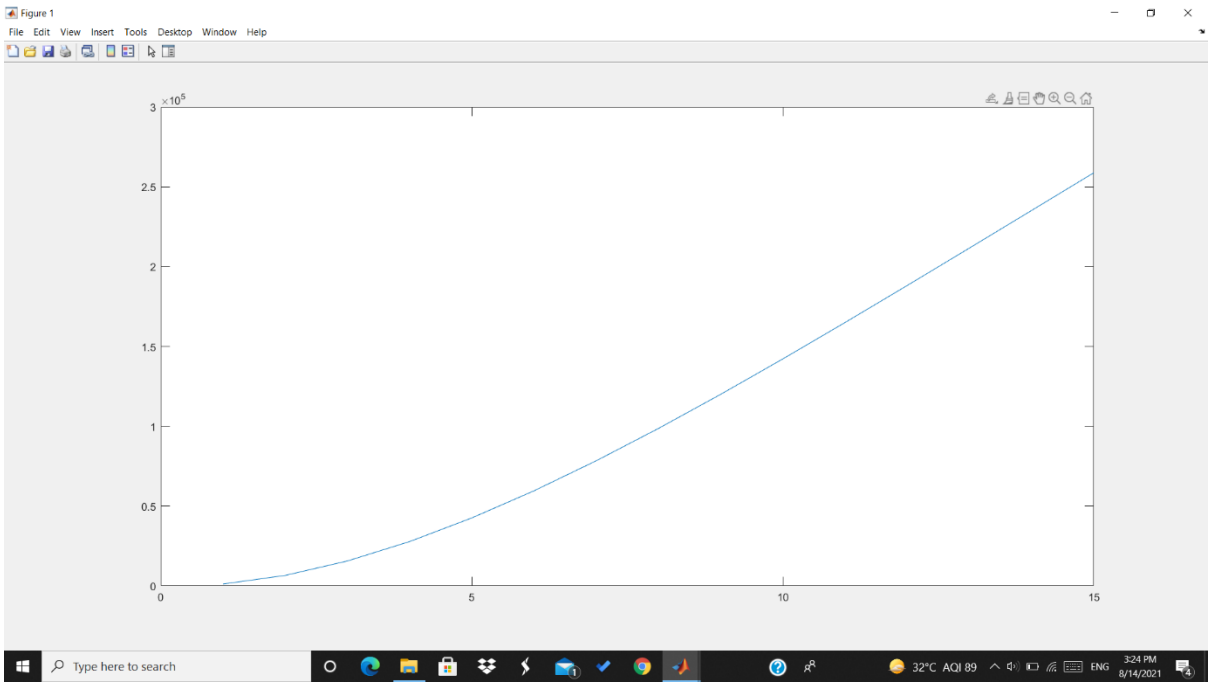
Figure 1
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3
2.5
2
1.5
1
0.5
0
0
5
10
15
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32°C AQI 89
ENG
3:24 PM
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