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Math 467

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### Project 3

1. For the first part, I simply used the basic simplex function. I added the test for nonnegative values and for e vectors at the beginning of the function. Here is my code for the test.

```
function [Solution,BasicVar,Status]=basicsimplex(A,b,c,BasicVar0)

[m,n] = size(A);

%check b nonnegative
if b < 0
    disp('b must be nonnegative');
    return
end

%check A has e vectors
[checkA] = ismember(eye(m),A', 'rows');
if checkA - 1 < 0
    disp('A must have e vectors');
    return
end

[mConstr,ndim]=size(A);
Solution=[];
BasicVar=[];
Status=-1;
...
```

After the test the original provided basic simplex function resumes as normal.

2. This is basically the same problem but we need to construct a larger A using three input matrices. So I scan each A matrix's size, whichever has the largest column size is the column size of the block matrix. We construct the block matrix iteratively. Code:

```

[m1,n1] = size(A1);
[m2,n2] = size(A2);
[m3,n3] = size(A3);

%Construct block matrix
n = max(n1,n2,n3);
A = zeros(m1+m2+m3,n);

for i=1:m1
    for j=1:n1
        A(i,j) = A1(i,j);
    end
end

for i=1:m2
    for j=1:n2
        A(m1+i,j) = A2(i,j);
    end
end

for i=1:m3
    for j=1:n3
        A(m1+m2+i,j) = A3(i,j);
    end
end

% Construct b vector

b = [b1;b2;b3];

```

Testing on A

A =

1	0	2
2	2	1
3	1	0
2	5	7
4	5	0
3	2	0

b =

3
3
2
1
2
3
2
2

A must have e vectors

```
>> A1 = [0 0 0 1 0; 0 0 0 0 1];  
A2 = [1 2 0];  
A3 = [0 7 1 3];  
b1 = [1 2]';  
b2 = [3]';  
b3 = [4]';
```

A =

0	0	0	1	0
0	0	0	0	1
1	2	0	0	0
0	7	1	3	0

b =

1  
2  
3  
4

ans =

2.7143  
0.1429  
0  
1.0000  
2.0000

Everything is working as expected.

3. I am analyzing Covid Cases in LA vs. Number of passengers coming into LAX from January 2021 to August 2022. However, I will be offsetting

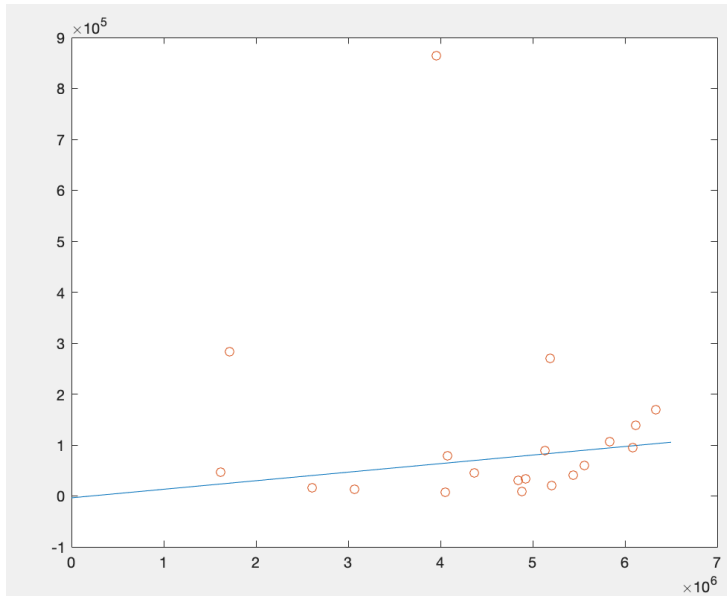
I got the Covid Data from

[http://dashboard.publichealth.lacounty.gov/covid19\\_surveillance\\_dashboard/](http://dashboard.publichealth.lacounty.gov/covid19_surveillance_dashboard/)

I got the airplane data from

<https://www.lawa.org/lawa-investor-relations/statistics-for-lax/volume-of-air-traffic>.

The L1 regression returned  $y=0$  as the best fit line. The L2 regression returned approximately  $.01679 \cdot x - 3635$ .



It seems to fit.