Group - 9
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DSP Lab - 1 Introduction to Matlab

Preparation

1. MATLAB - Matrix Laboratory
2. Variables, Vectors and Matrices

3.

```
v = -1:0.1:1;
s = [];
for i = 1:numel(v)
    if(v(i) >= 0)
        s = [s '+'];
    else
        s = [s '-'];
    end
end
disp(s);
```

Output -

```
----------++++++++++++
```

4. - size(G) = 5 x 4, it is not a square matrix since no of rows are not equal to no of columns.
   - Indices of the elements that contain the value 0

```
[row,col] = find(G==0.5);
[row col]

4   ,  1
2   ,  2
4   ,  2
4   ,  4
5   ,  4
```

- Indices of the element that contain negative values

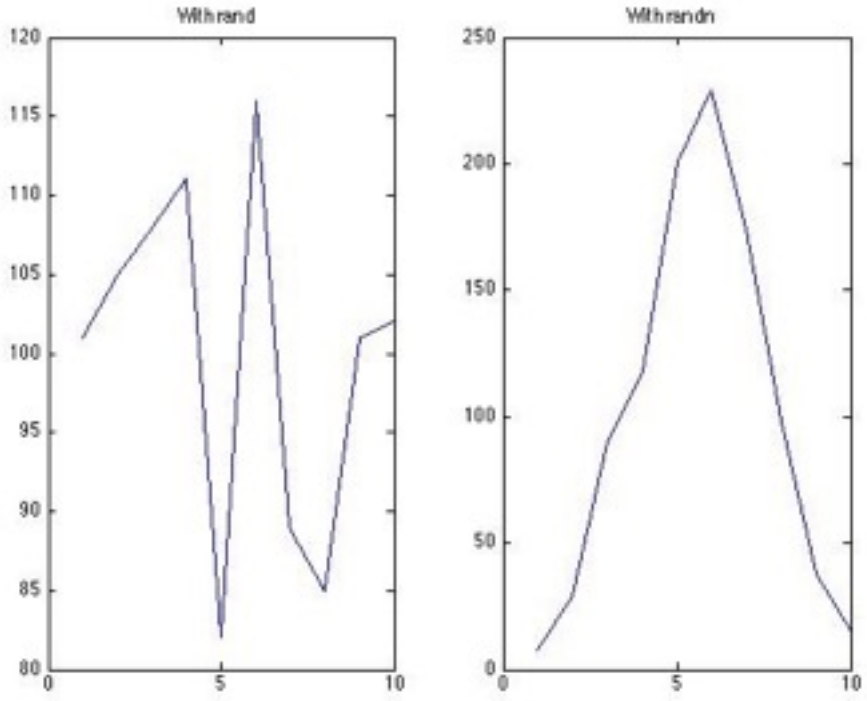
```
[row,col] = find(G < 0);
    [row col]

     5     2
     2     3
     5     3
     1     4
     2     4
```

4.3 Statistical Measurement
code:

```
x = rand(1000,1);
subplot(1,2,1),plot(hist(x))
minx = min(x);
maxx = max(x);
meanx = mean(x);
stdx = std(x);

y = (4 * x) - 2;
miny = min(y);
maxy = max(y);
meany = mean(y);
stdy = std(y);

fprintf('With rand(x) \n');
fprintf('Mean of x  = %f \n',meanx);
fprintf('Standard Deviation of x = %f
\n',stdx);
fprintf('Minimum value of x = %f
\n',minx);
fprintf('Maximum value of x  = %f
\n',maxx);

fprintf('Mean of y  = %f \n',meany);
fprintf('Standard Deviation of y  = %f
\n',stdy);
fprintf('------------------------------
\n',maxy);


x = randn(1000,1);
subplot(1,2,2),plot(hist(x))
minx = min(x);
maxx = max(x);
meanx = mean(x);
stdx = std(x);

y = (4 .* x) - 2;
miny = min(y);
maxy = max(y);
meany = mean(y);
stdy = std(y);

fprintf('With randn(x) \n');
fprintf('Mean of x  = %f \n',meanx);
fprintf('Standard Deviation of x = %f
\n',stdx);
fprintf('Minimum value of x = %f
\n',minx);
fprintf('Maximum value of x  = %f
```

result -

```
With rand(x)
Mean of x  = 0.487812
Standard Deviation of x = 0.289792
Minimum value of x = 0.001722
Maximum value of x  = 0.999119
Mean of y  = -0.048752
Standard Deviation of y  = 1.159168
------------------------------
With randn(x)
Mean of x  = 0.053188
Standard Deviation of x = 1.009429
Minimum value of x = -3.534966
Maximum value of x  = 3.482697
Mean of y  = -1.787246
Standard Deviation of y  = 4.037716
```

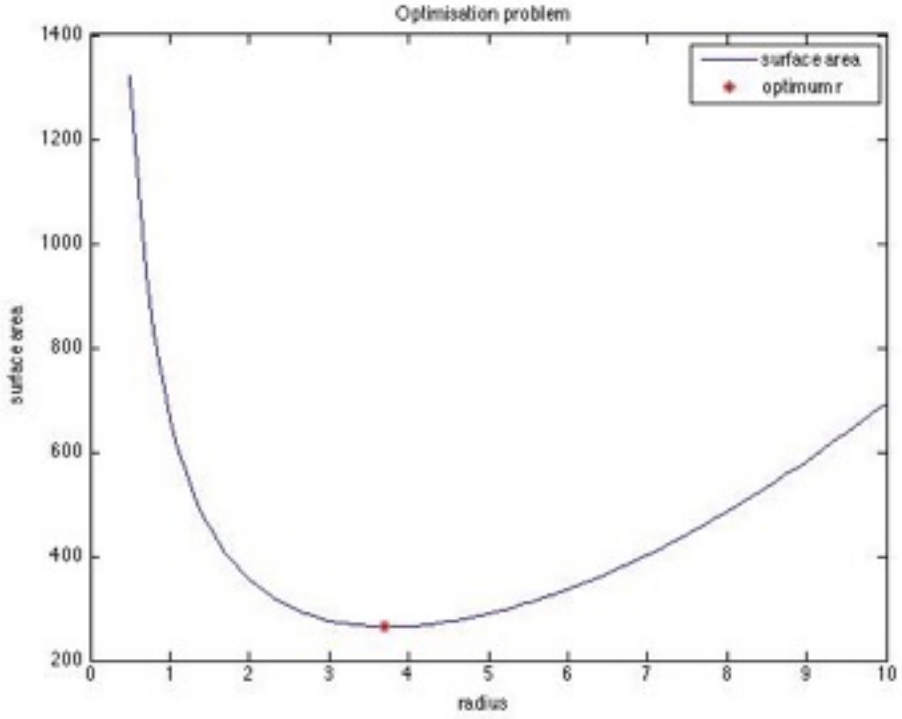


4.4

Code :

```
r = 0.5:0.1:10; % in cm
V = 330; % in cm3
aofr = (2 * pi * (r .* r)) + ( (2 * V)./r);
[minaofr,indminaofr] = min(aofr);
optr = r(indminaofr);
plot(r,aofr);
hold on
plot(optr, minaofr,'*r');
title('Optimisation problem');
xlabel('radius'); ylabel('surface area');
fprintf('Minimum Surface area is %f and optimal r is %f \n',minaofr,optr);
```

Result: **Minimum Surface area is 264.395185 and optimal r is 3.700000**



4.5 The moving average

```
load('glob_warm.mat');
m = 7;
N = numel(year);
mavgTa = zeros(numel(N));
for curyear = 1:N
    if(curyear < (m+1))
        mavgTa(curyear) = (sum(Ta(1:curyear))/curyear);
    elseif(curyear > (N-m))
        mavgTa(curyear) = (sum(Ta(curyear - m:N))/
numel((curyear - m):N));
    else
        mavgTa(curyear) = (sum(Ta(curyear - m: curyear +
m))/((2*m) + 1));
    end
end
plot(year,Ta,'b');
hold on
plot(year, mavgTa,'r');
title('Moving Average'); xlabel('Years'); ylabel('Yearly
Anomaly');
legend('original val','averaged val')
```

Code:
result :