Day 5

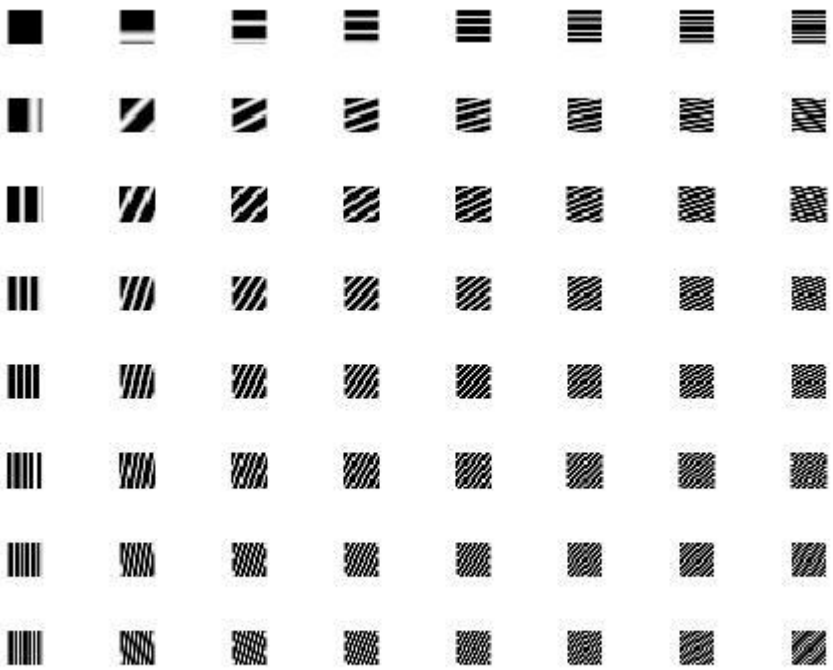
Date: 08/09/2016

1. **Write a MATLAB program for generating basis images of 8x8 DFT.**
2. **Write a MATLAB program for generating basis images of 8x8 DCT.**
3. **Write a MATLAB program for generating the Fourier spectrum of a given figure.**
4. **Write a MATLAB program for showing linearity property of DFT**

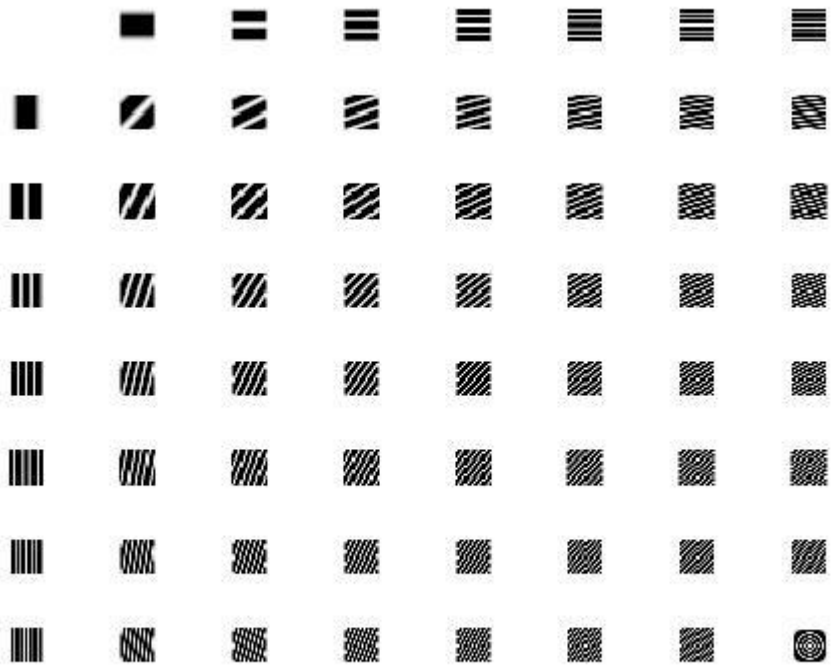
Discrete Fourier Transform,basis
Code:

```
clear ;
clc ;
close all;

I = zeros(16,16);
for i=1:1:16
    for j=1:1:16
     I(i,j) = exp(-2*pi*1i/16).^((i-1)*(j-1));

    end
end
c = 1;
for i=1:1:16
    for j=1:1:16
     In = I(:,j)*I(i,:);
     Im = imag(In);
      subplot(16,16,c),imshow(Im);
      c = c+1;
    end
end
figure,
c = 1;
for i=1:1:16
    for j=1:1:16
     In = I(:,j)*I(i,:);
     re = real(In);
      subplot(16,16,c),imshow(re);
      c = c+1;
    end
end

figure,
I1 = zeros(8,8);
for i=1:1:8
    for j=1:1:8
     I1(i,j) = exp(-2*pi*1i/16).^((i-1)*(j-1));
    end
end
c = 1;
for i=1:1:8
    for j=1:1:8
     In1 = I(:,j)*I(i,:);
     Im1 = imag(In1);
```

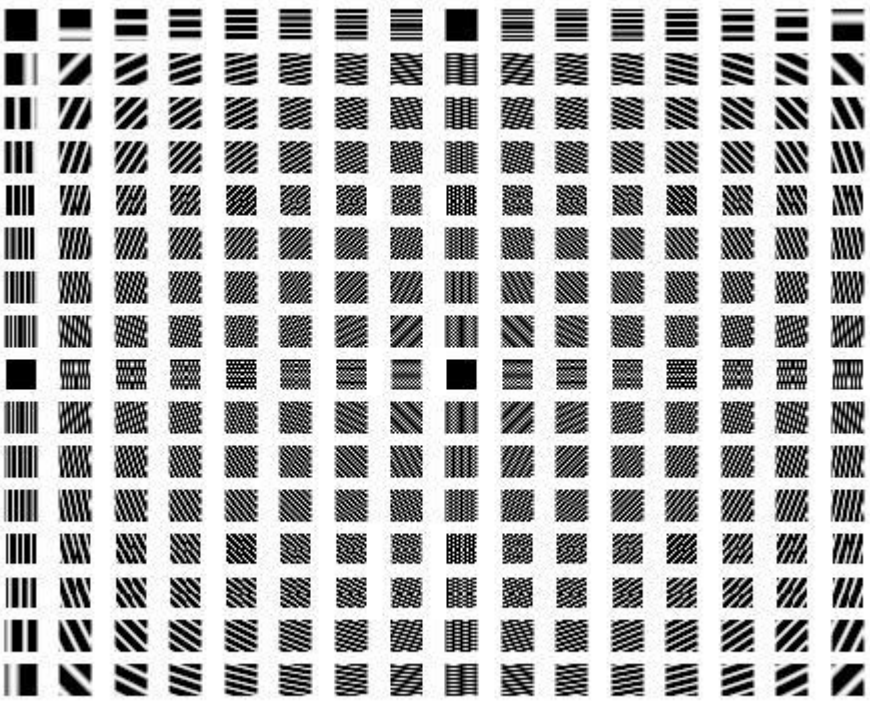
```
      subplot(8,8,c),imshow(Im1);
      c = c+1;
    end
end
figure,
c = 1;
for i=1:1:8
    for j=1:1:8
     In1 = I(:,j)*I(i,:);
     re1 = real(In1);
      subplot(8,8,c),imshow(re1);
      c = c+1;
    end
end
imshow(I);
```



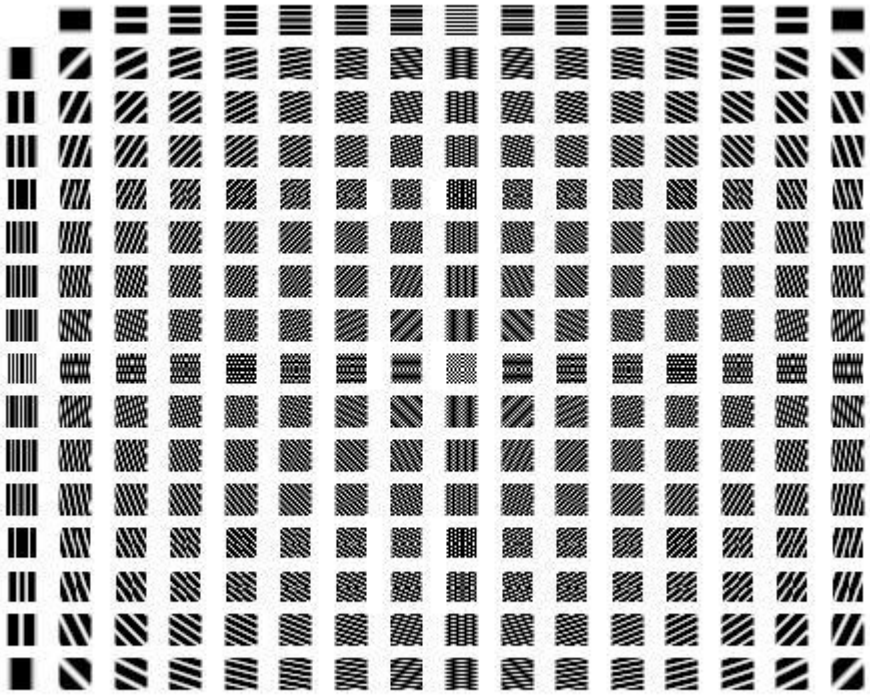
Imaginary part 8X8



Real part 8X8



Imaginary part 16X16

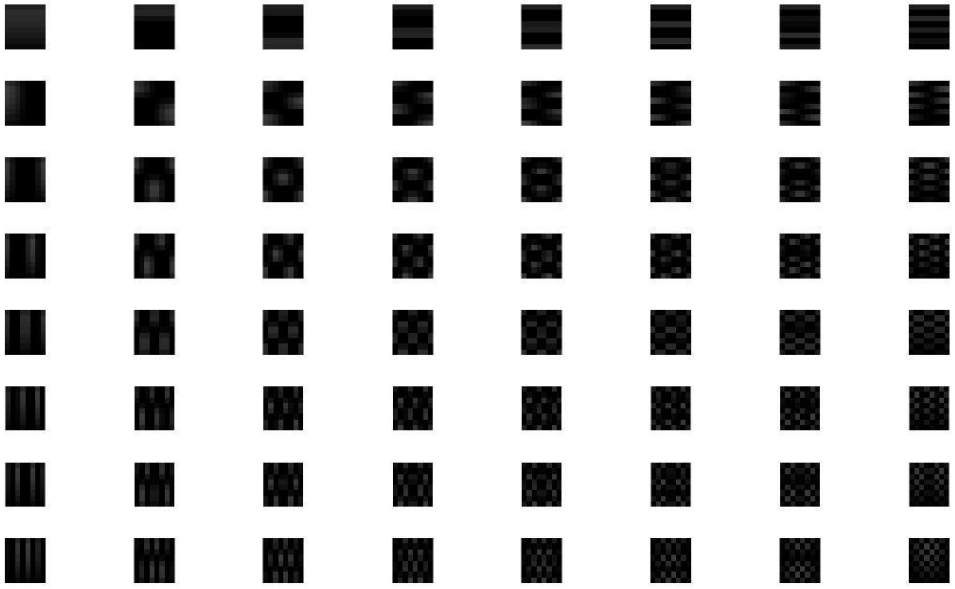


Real Part 16X16

DCT, Basis
Code:

```
clear all;
clc ;
close all;

%I = zeros(16,16);
for i=0:7
     for j=0:7
          if j==0
               alpha = sqrt(1/8);
          else
               alpha = sqrt(2/8);
          end
          I(i+1,j+1) = alpha * cos((pi*(2*i+1)*j)/16);
     end
end
c = 1;
for i=1:1:8
```

```
    for j=1:1:8
     In = I(:,j)*I(i,:);
      subplot(8,8,c),imshow(In);
      c = c+1;
    end
end
```

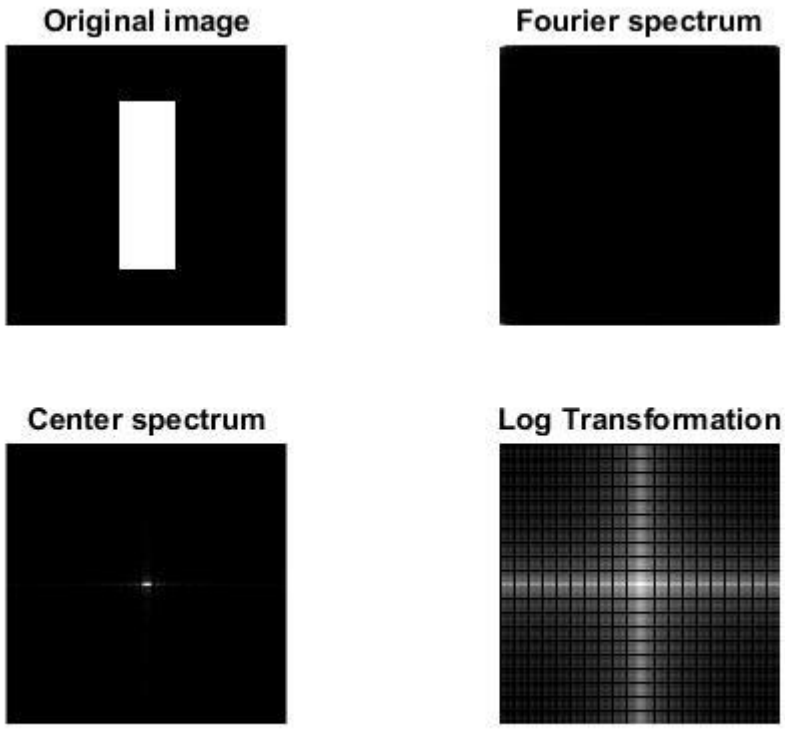


DCT of 8X8 image

Frequency Spectrum
Code:

```
clc;
clear all;
close all;
imgA=zeros(200);


for i=1:size(imgA,1)
   for j=1:size(imgA,2)
      if(i>=41 && i<=160) &&(j>=81 && j<=120)
```

```
            imgA(i,j) = 1;
        end
    end
end

subplot(2,2,1),imshow(imgA), title('Original image')

DFT = fft2(imgA);
ABS = abs(DFT);
subplot(2,2,2), imshow(ABS, []), title('Fourier
spectrum')

CS = fftshift(DFT);
subplot(2,2,3), imshow(abs(CS),[]), title('Center
spectrum')

lg = 1 + log(abs(CS));
subplot(2,2,4), imshow(lg,[]), title('Log
Transformation')

figure, imagesc(lg)
```



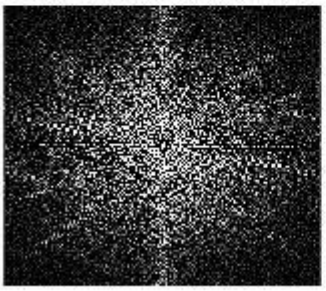
DFT Linearity
Code:

```
clear all;
close all;
clc;

img = imread('index.png');
img1 = imread('index12.jpg');



img = rgb2gray(img);
img1 = rgb2gray(img1);
img3 = 2*img1+ img;
dft2 = fft2(2*img1);
dft1 = fft2(img);

dft3 = dft1 + dft2;
dft = fft2(img3);
c =0;
[m,n] = size(dft)


subplot(2,2,1),imshow(img), title('f1(x,y)')
subplot(2,2,2),imshow(img1), title('f2(x,y)')

subplot(2,2,3),imshow(uint8(dft3)),
title('F[a*f1(x,y)+b*f2(x,y)]')
subplot(2,2,4),imshow(uint8(dft)),
title('a*F1(u,v)+b*F2(u,v)]')
```

f1(x,y)

f2(x,y)

F[a*f1(x,y)+b*f2(x,y)]



a*F1(u,v)+b*F2(u,v)]