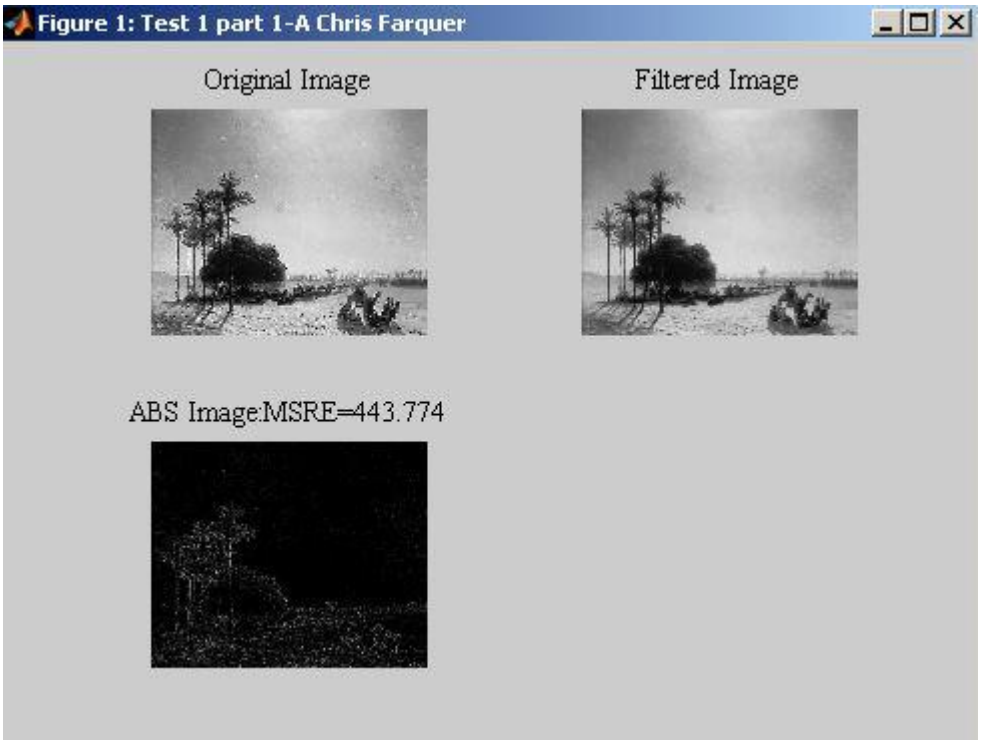
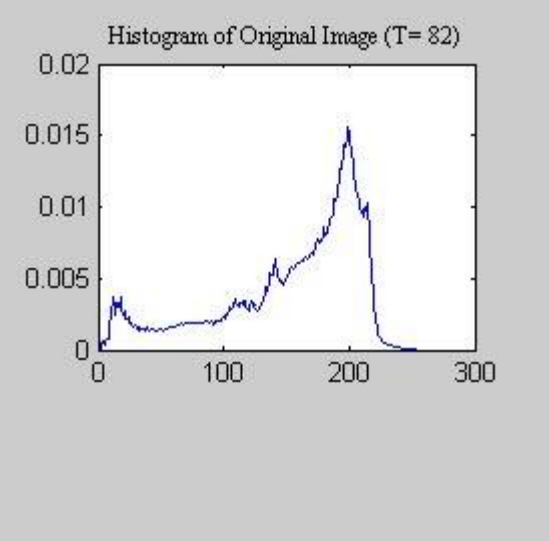
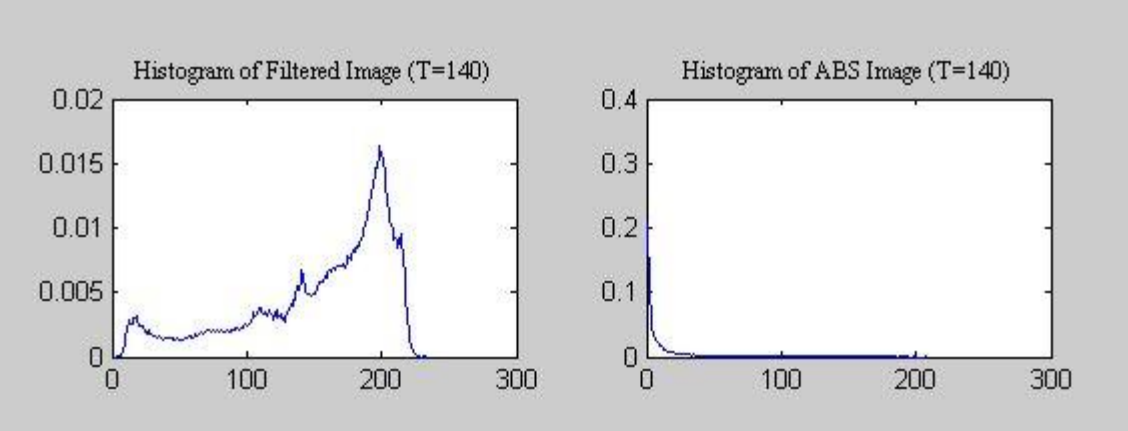
```
%Test 1

%read in the image
Y=imread('aivazovsky78g.tif','tif');
info=imfinfo('aivazovsky78g.tif','tif');

%display image
h_fig=figure;
set(h_fig,'Tag','Fig1', ...
    'Name','Test 1 part 1-A Chris Farquer', ...
    'MenuBar','none', ...
    'Position', [10 384 488 350]);
h_s1=subplot(2,2,1);
image(Y);
colormap(gray(255));
axis('image')
axis off;
h_t1=title('Original Image');
set(h_t1,'FontName','Times','FontSize',10,'Color','k');
X=double(Y);
[N,M]=size(X);
pause(1)

%filter image
f=X;
h1=(1/5)*[0 1 0;1 1 1; 0 1 0];
fps=fft2(f,N+2,M+2);
mps=fft2(h1,N+2,M+2);
G=fps.*mps;
g=ifft2(G,N+2,M+2);
g=real(g);
g=g.*(g>0);
g1=g(1:N,1:M);

%display new image
h_s2=subplot(2,2,2);
image(g1)
colormap(gray(255));
axis('image')
axis off;
h_t1=title('Filtered Image');
set(h_t1,'FontName','Times','FontSize',10,'Color','k');
pause(1)

%image4
a=abs(X-g1);
h_s2=subplot(2,2,3);
image(a);
colormap(gray(255));
axis('image')
axis off;
h_t1=title('ABS Image:MSRE=443.774');
```

```
set(h_t1,'FontName','Times','FontSize',10,'Color','k');


%mean square root error
error=X-g1;
MSRE=sum(sum(error.*error))/(M*N)
pause(2)


%new figure window
h1_fig=figure;
set(h_fig,'Tag','Fig1', ...
    'Name','Test 1 Part 1-A  Chris Farquer', ...
    'MenuBar','none', ...
    'Position', [5 384 488 200]);

%histograms
H=hist_my(f,2,2,2,'b');
for T=0:140;
    x=[T T]; y=[0,H(T+1)];
    h_s3=subplot(2,2,2);
    hold on;
    h_line=line(x,y);
    set(h_line,'Color','r');
    sT=sprintf('Histogram of Original Image (T=%3g)',T);
    h_txt=text(T-2,y(2)+0.001,'T'); % delete(h_txt);
    h_title=title(sT);
    set(h_title,'FontName','Times','FontSize',9);
    pause(0.1)


    pause(.1);
    delete(h_txt);
    delete(h_line);
end

H=hist_my(g1,2,2,3,'b');
for T=0:140;
    x=[T T]; y=[0,H(T+1)];
    h_s3=subplot(2,2,3);
    hold on;
    h_line=line(x,y);
    set(h_line,'Color','r');
    sT=sprintf('Histogram of Filtered Image (T=%3g)',T);
    h_txt=text(T-2,y(2)+0.001,'T'); % delete(h_txt);
    h_title=title(sT);
    set(h_title,'FontName','Times','FontSize',9);
    pause(0.1)


    pause(.1);
    delete(h_txt);
    delete(h_line);
end
```

```
H=hist_my(a,2,2,4,'b');
for T=0:140;
    x=[T T]; y=[0,H(T+1)];
    h_s3=subplot(2,2,4);
    hold on;
    h_line=line(x,y);
    set(h_line,'Color','r');
    sT=sprintf('Histogram of ABS Image (T=%3g)',T);
    h_txt=text(T-2,y(2)+0.001,'T'); % delete(h_txt);
    h_title=title(sT);
    set(h_title,'FontName','Times','FontSize',9);
    pause(0.1)


    pause(.1);
    delete(h_txt);
    delete(h_line);
end
```








```
%Test 1

%read in the image
Y=imread('aivazovsky78g.tif','tif');
info=imfinfo('aivazovsky78g.tif','tif');

%display image
h_fig=figure;
set(h_fig,'Tag','Fig1', ...
    'Name','Test 1 part 1-B   Chris Farquer', ...
    'MenuBar','none', ...
    'Position', [10 384 488 350]);
h_s1=subplot(2,2,1);
image(Y);
colormap(gray(255));
axis('image')
axis off;
h_t1=title('Original Image');
set(h_t1,'FontName','Times','FontSize',10,'Color','k');
X=double(Y);
[N,M]=size(X);
pause(1)
```

```
%filter image
f=X;
h2=(1/10)*[0 0 1 0 0;0 0 1 0 0;1 1 2 1 1; 0 0 1 0 0;0 0 1 0 0];
fps1=fft2(f,N+2,M+2);
mps1=fft2(h2,N+2,M+2);
G1=fps.*mps;
g2=ifft2(G,N+2,M+2);
g2=real(g);
g2=g.*(g>0);
g3=g(1:N,1:M);

%display new image
h_s2=subplot(2,2,2);
image(g2)
colormap(gray(255));
axis('image')
axis off;
h_t1=title('Filtered Image');
set(h_t1,'FontName','Times','FontSize',10,'Color','k');
pause(1)

%image4
a=abs(X-g1);
h_s2=subplot(2,2,3);
image(a);
colormap(gray(255));
axis('image')
axis off;
h_t1=title('ABS Image:MSRE=443.774');
set(h_t1,'FontName','Times','FontSize',10,'Color','k');


%mean square root error
error=X-g1;
MSRE=sum(sum(error.*error))/(M*N)
pause(2)


%new figure window
h1_fig=figure;
set(h_fig,'Tag','Fig1', ...
    'Name','Test 1 part 1-B   Chris Farquer', ...
    'MenuBar','none', ...
    'Position', [5 384 488 200]);

%histograms
H=hist_my(f,2,2,2,'b');
for T=0:140;
    x=[T T]; y=[0,H(T+1)];
    h_s3=subplot(2,2,2);
    hold on;
    h_line=line(x,y);
    set(h_line,'Color','r');
```

```
    sT=sprintf('Histogram of Original Image (T=%3g)',T);
    h_txt=text(T-2,y(2)+0.001,'T'); % delete(h_txt);
    h_title=title(sT);
    set(h_title,'FontName','Times','FontSize',9);
    pause(0.1)


    pause(.1);
    delete(h_txt);
    delete(h_line);
end

H=hist_my(g2,2,2,3,'b');
for T=0:140;
    x=[T T]; y=[0,H(T+1)];
    h_s3=subplot(2,2,3);
    hold on;
    h_line=line(x,y);
    set(h_line,'Color','r');
    sT=sprintf('Histogram of Filtered Image (T=%3g)',T);
    h_txt=text(T-2,y(2)+0.001,'T'); % delete(h_txt);
    h_title=title(sT);
    set(h_title,'FontName','Times','FontSize',9);
    pause(0.1)


    pause(.1);
    delete(h_txt);
    delete(h_line);
end

H=hist_my(a,2,2,4,'b');
for T=0:140;
    x=[T T]; y=[0,H(T+1)];
    h_s3=subplot(2,2,4);
    hold on;
    h_line=line(x,y);
    set(h_line,'Color','r');
    sT=sprintf('Histogram of ABS Image (T=%3g)',T);
    h_txt=text(T-2,y(2)+0.001,'T'); % delete(h_txt);
    h_title=title(sT);
    set(h_title,'FontName','Times','FontSize',9);
    pause(0.1)


    pause(.1);
    delete(h_txt);
    delete(h_line);
end
```

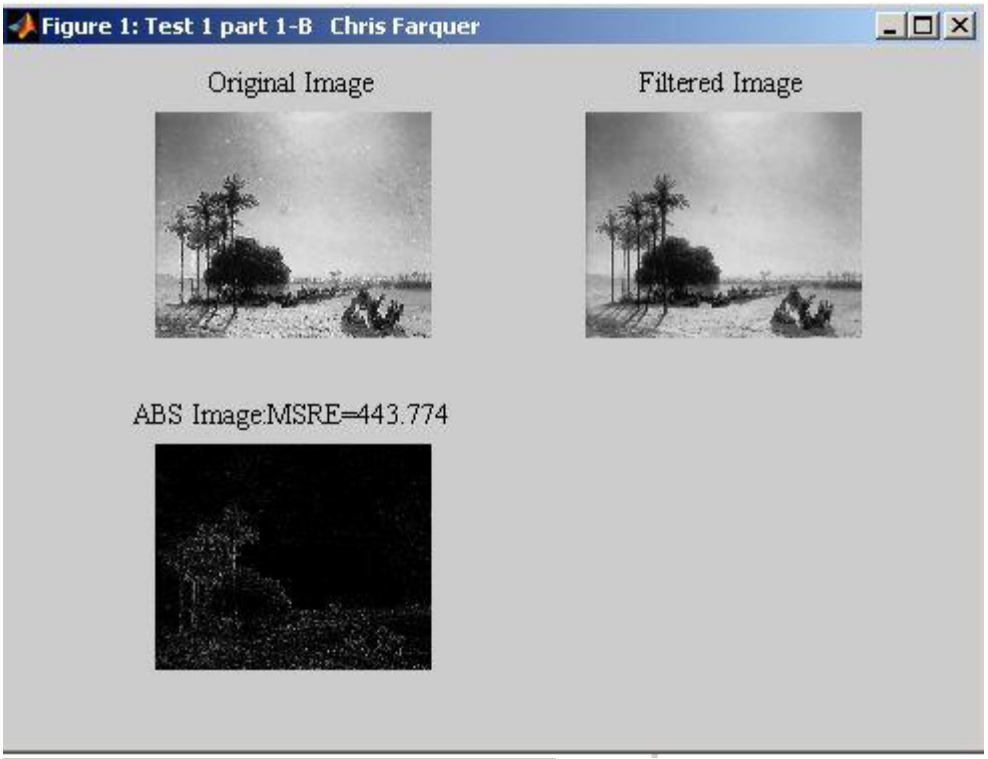
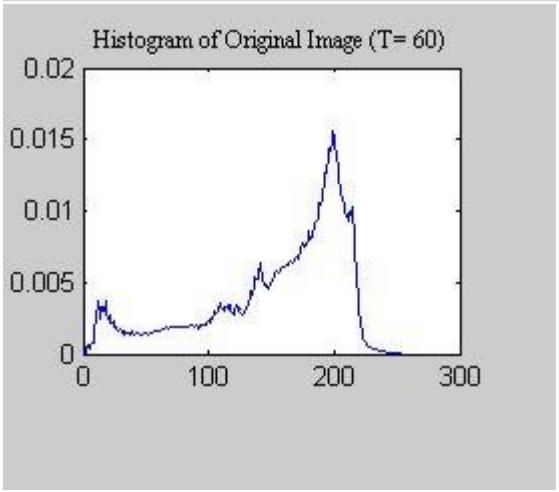
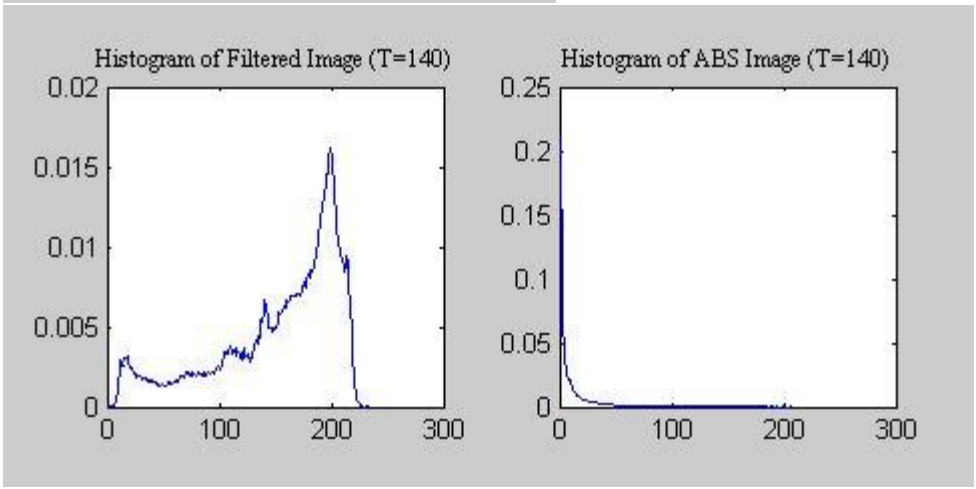


Figure 1: Test 1 part 1-B Chris Farquer
Original Image
Filtered Image
ABS Image:MSRE=443.774


Histogram of Original Image (T= 60)
0.02
0.015
0.01
0.005
0
0
100
200
300


Histogram of Filtered Image (T=140)
0.02
0.015
0.01
0.005
0
0
100
200
300
Histogram of ABS Image (T=140)
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300

```
N=256;
sname='tree.img';
fid=fopen(sname,'rb');
X=fread(fid,[N,N]);
fclose(fid); clear fid;

% transposition
X=X';
[N,M]=size(X);

h_fig=figure('Tag','Fig 1:',...
    'Name',' Test 1:WIndowed part 2-A, Chris Farquer',...
    'Position',[9 385 530 294]);
set(h_fig,'MenuBar','none');
mm=max(max(X));

%gray scale
colormap(bone(mm));
h_1=subplot(2,2,1);
image(X);
axis('image');
axis off;
h_t1=title('Original Image');
set(h_t1,'FontName','Times','FontSize',10,'Color','k');
pause(2)

%filter image
h1=[1 0 1;0 -4 0;1 0 1];
fps=fft2(X,N+2,M+2);
mps=fft2(h1,N+2,M+2);
G=fps.*mps;
g=ifft2(G,N+2,M+2);
g=real(g);
g=g.*(g>0);
g1=g(1:N,1:M);

%display new image
h_s2=subplot(2,2,2);
image(g1)
colormap(bone(mm));
axis('image')
axis off;
h_t1=title('Filtered Image');
set(h_t1,'FontName','Times','FontSize',10,'Color','k');
pause(1)

h=(1/5)*[1 0 1;0 1 0;1 0 1];
fps=fft2(X,N+2,M+2);
mps=fft2(h,N+2,M+2);
G=fps.*mps;
g=ifft2(G,N+2,M+2);
g=real(g);
g=g.*(g>0);
g2=g(1:N,1:M);
```

```
h_s3=subplot(2,2,3);
image(g2)
colormap(bone(mm));
axis('image')
axis off;
h_t1=title('Blur Image');
set(h_t1,'FontName','Times','FontSize',10,'Color','k');
pause(2)


h_fig=figure('Tag','Fig 1:',...
    'Name',' Test 1:WIndowed part 2-B, Chris Farquer',...
    'Position',[5 384 488 200]);
set(h_fig,'MenuBar','none');
mm=max(max(X));

%gray scale
colormap(bone(mm));
h_1=subplot(2,2,1);
image(X);
axis('image');
axis off;
h_t1=title('Original Image');
set(h_t1,'FontName','Times','FontSize',10,'Color','k');
pause(2)

%filter image
h1=[1 4 1;4 -20 4;1 4 1];
fps=fft2(X,N+2,M+2);
mps=fft2(h1,N+2,M+2);
G=fps.*mps;
g=ifft2(G,N+2,M+2);
g=real(g);
g=g.*(g>0);
g1=g(1:N,1:M);

%display new image
h_s2=subplot(2,2,2);
image(g1)
colormap(bone(mm));
axis('image')
axis off;
h_t1=title('Filtered Image');
set(h_t1,'FontName','Times','FontSize',10,'Color','k');
pause(1)

h=(1/5)*[1 0 1;0 1 0;1 0 1];
fps=fft2(X,N+2,M+2);
mps=fft2(h,N+2,M+2);
G=fps.*mps;
g=ifft2(G,N+2,M+2);
g=real(g);
g=g.*(g>0);
g2=g(1:N,1:M);
```

```
h_s3=subplot(2,2,3);
image(g2)
colormap(bone(mm));
axis('image')
axis off;
h_t1=title('Blur Image');
set(h_t1,'FontName','Times','FontSize',10,'Color','k');
pause(2)
```

Figure 1: Test 1:WIndowed part 2-A, Chris Farquer

Original Image

Filtered Image

Blur Image

Figure 2: Test 1:WIndowed part 2-B, Chris Farquer

Original Image

Filtered Image

Blur Image