Image Processing Project 1
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Problem 1.1

Code:

```
img = double(imread('Fig0219(rose1024).tif'));
imgmask = mask(1024, 1024, 256, 256, 768, 768);
imshow(img.*imgmask, 'DisplayRange', [0, 255]);
function m = mask(M, N, rUL, cUL, rLR, cLR)
   m = zeros(M, N);
   if rUL < 0 || rUL > M || cUL < 0 || cUL > N || rLR < 0 || rLR > M || cLR < 0 || cLR > N
      fprintf('error')
      m = 0;
   else
      for i = rUL : rLR
         for j = cUL : cLR
            m(i, j) = 1;
         end
      end
   end
end
```

Applying the specified mask to the rose image resulted in this image:

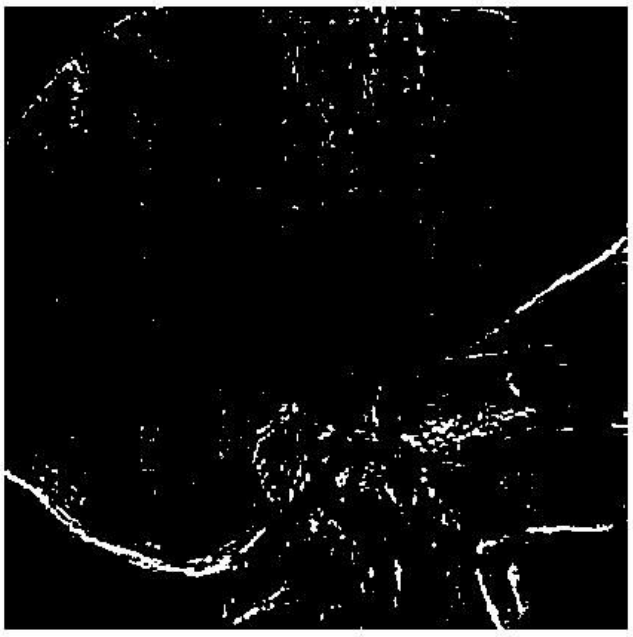
Problem 1.2

Code:

```
im1 = imread('Fig0228(b)(angiography_live_ image).tif');
im2 = imread('Fig0228(a)(angiography_mask_image).tif');
newim = imArithmetic(im1, im2, 'subtract');
imshow(newim);
function g = imArithmetic(f1, f2, op)
   switch op
      case 'add'
         g1 = f1+f2;
      case 'subtract'
         g1 = f1-f2;
      case 'multiply'
         g1 = f1.*f2;
      case 'divide'
         g1 = f1./f2;
      otherwise
         fprintf('Error');
         g = 0;
   end

   gm = g1 - min(g1);
   g = 255*(abs(gm./max(gm)));
end
```

Subtracting the angiography mask image from the live image resulted in this image:



Problem 1.3

Code:

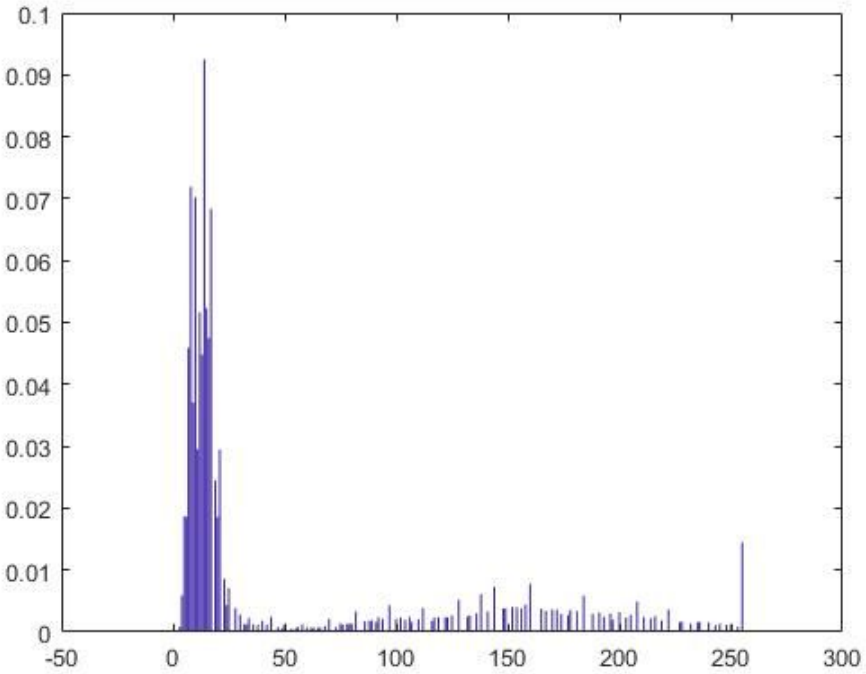
```
rose = imread('Fig0219(rose1024).tif');
angiography = imread('Fig0228(b)(angiography_live_ image).tif');
imageHist(rose, 'n')
meanVariance(rose)
imageHist(angiography, 'n')
meanVariance(angiography)
histEqual(rose)
histEqual(angiography)
function h = imageHist(f, op)
   switch op
      case 'u'
         imhist(f);
         h = imhist(f);
      otherwise
         [counts,bins] = imhist(f);
         [m, n] = size(f);
         normalizedc = counts/(m*n);
         bar(bins, normalizedc)
         h = [normalizedc, bins];
   end
end

function [mean, variance] = meanVariance(f)
   h = imageHist(f, 'n');
   counts = h(1:256);
   bins = h(257:512);
   mult = bins.*counts;
   mean = sum(mult)
   variance = sum((bins-mean).^2.*counts)
end

function g = histEqual(f)
   eqhist = zeros(1, 256);
   h = imageHist(f, 'n');
   counts = h(1:256);
   bins = h(257:512);
   currentSum = 0;
   for i = 1 : 256
      currentSum = currentSum + counts(i);
```

```
        eqhist(i) = floor(255*currentSum);
    end
    bar(bins, eqhist)
    [m, n] = size(f);
    g = zeros(m, n);
    for i = 1 : m
      for j = 1 : n
        imageindex = f(i, j) + 1;
        g(i, j) = eqhist(imageindex);
      end
    end
    imshow(g, 'DisplayRange', [0, 255]);
end
```

The normalized histogram, variance and mean for the rose:



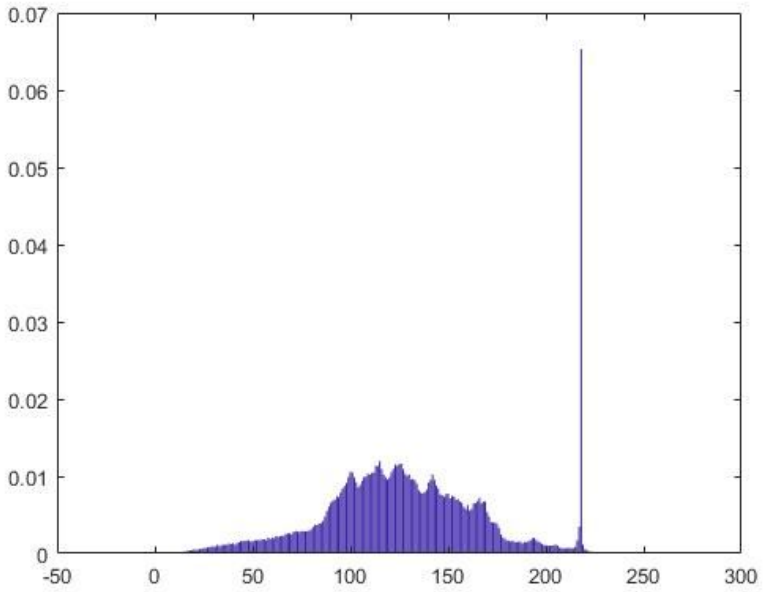

```
mean =

   46.7894


variance =

   4.3698e+03
```

The normalized histogram, variance and mean for the angiography live image:



mean =

129.3059

variance =

1.8564e+03

The histogram equalized rose:

The hisogram equalized angiography mask: