Contents

Question 1. Part A

```
clear all;
close all;

load('hw2_data/hw2_XYZ.mat');
load('hw2_data/hw2_face.mat');
load('hw2_data/hw2_light.mat');
load('hw2_data/hw2_display.mat');

[x y z] = size(face1Spectrum);

A = XYZSpectra' * display1Spectra;
B = [ XYZSpectra(:,1)' .* light1Spectrum;
      XYZSpectra(:,2)' .* light1Spectrum;
      XYZSpectra(:,3)' .* light1Spectrum];
T = inv(A) * B;
```

Question 1. Part B

```
faceRGB = zeros(x,y,3);
for i = 1:x
    for j = 1:y
        p = face1Spectrum(i,j,:);
        w = T * p(:);
        faceRGB(i,j,:) = w.^(1/2.2);
    end
end

imshow(faceRGB);
title('RGB image with gamma pre-distortion');
```

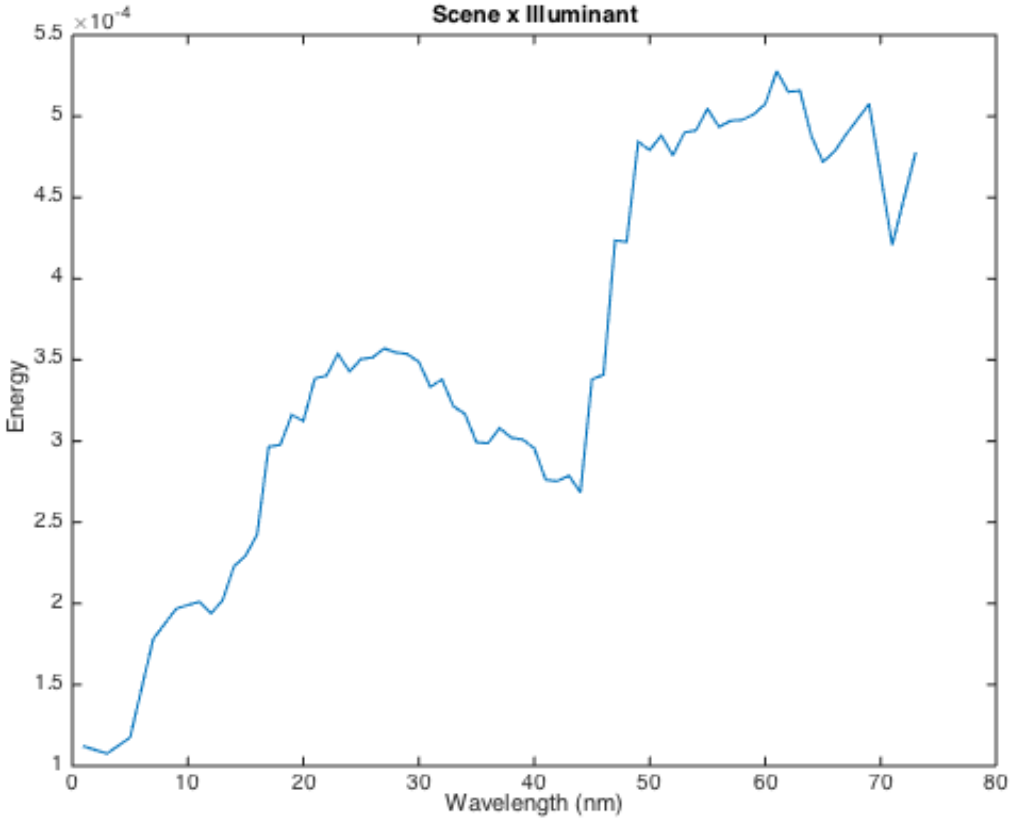
RGB image with gamma pre-distortion

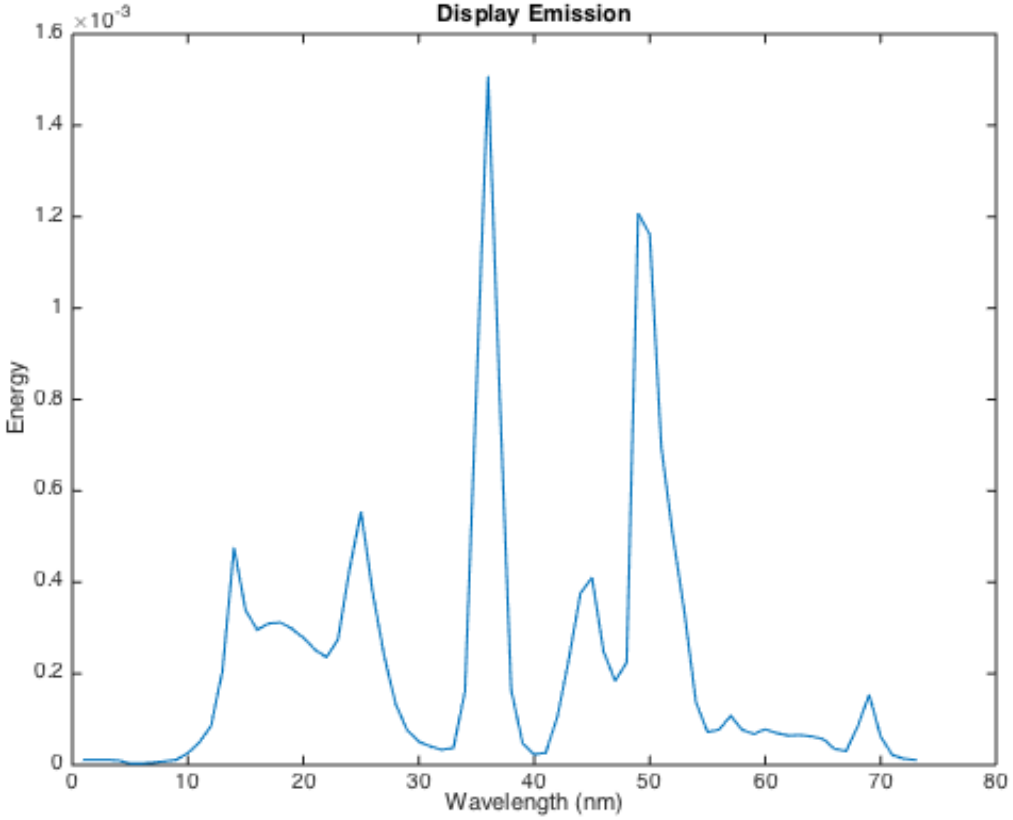
Question 1. Part C

```
p = face1Spectrum(47,149,:);
prod = light1Spectrum' .* p(:);
figure;
plot(prod);
title('Scene x Illuminant');
xlabel('Wavelength (nm)');
ylabel('Energy');

w = T * p(:);
disppx = w(1) * display1Spectra(:,1) + w(2) * display1Spectra(:,2) + w(3) * display1Spectra
(:,3);
figure; plot(disppx);
title('Display Emission');
xlabel('Wavelength (nm)');
ylabel('Energy');

% Because both of these spectra map to the same perceived color, these two
% spectra are metamers.
```


Scene x Illuminant
×10^-4
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
Energy
0
10
20
30
40
50
60
70
80
Wavelength (nm)


Display Emission
×10^-3
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Energy
0
10
20
30
40
50
60
70
80
Wavelength (nm)

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