

1 Instructions

Please save your code for the following exercises to an m-file and send it to me via email (suadusum@ucsd.edu). To help you download a file called `lab3start.m` (<http://topex.ucsd.edu/rs/lab3/lab3start.m>). This file has a few lines of code to get you started.

2 Exercises

1) Plot the spectral radiance of a blackbody as a function of wavelength for object at 300 K (earth), 1000 K, and 6000 K (sun). Calculate the wavelength of peak radiation for each temperature, and plot it on the same figure (use `hold on`). The finished plot should look like figure 2.12 from Rees. *Hint:* You may find that this exercise requires careful use of the MATLAB operators `./` or `.*`.

2) Download a La Jolla topography file from

http://topex.ucsd.edu/rs/lab3/lajolla_swab

or

<http://topex.ucsd.edu/rs/lab3/lajolla> if you have a PowerPC mac.

Read the topography into an array and make an image. Can you make an illuminated image by using the `diff()` command? You will need to set the limits in `imagesc` to `[-1000,1000]` because there are some extreme slopes at the coastline.

Listing 1: Example of loading a topography image into MATLAB

```
1 % load the topography image
2 fid=fopen('lajolla_swab','r');
3 topo=fread(fid,[3240,1440],'int16');
```

3) Read in a jpeg photo (file of passive-source EM radiation at three visible bands) using `imread()`. (Use your own photo or the default file from <http://topex.ucsd.edu/rs/lab3/>. An image with bright colors works best.) Look the red, blue, and green components separately. Recombine the three bands into an RGB image. Do you get what you started with? Recombine the three bands in a different order (e.g., GBR) and look at the image. Do the results make sense to you? Are the originally red colors now green? Try another RGB combination. Write one of these recombined files to a jpeg file using `imwrite()`, and send it (and the original image) along with your code.

Listing 2: Example of loading a JPEG image into MATLAB and extracting a color component

```
1 % load the JPEG image
2 z=imread('Paraglider.jpg');
3 % extract the red component
4 r=z(:,:,1);
```