UNIVERSITY OF CALIFORNIA, SANTA BARBARA

Department of Electrical and Computer Engineering

Prof. P. Sen   **ECE 178 Digital Image Processing**   Fall 2017

Homework 1
Short assignment

Due Monday, October 9, at 9pm. Written portion due in the homework submission box, MATLAB portion due on GauchoSpace.

(please write your name and discussion section number clearly at top of first page of written portion)

Book Problems

1. 2.5

2. 2.19

Other Problems

1. What is the number of photons/second being emitted from a 100 W light bulb if it only emits 500nm light and assuming it is 10% efficient?

2. A 100 W light bulb is placed inside a homogeneous sphere that is 2m in diameter. What is the irradiance on the surface of the sphere?

3. Parallel rays of light with radiance $10W/m^2sr$ impinge on a surface that is tilted at 30°. What is the irradiance on the surface?

MATLAB Problem

Write a simple MATLAB program that reads in a grayscale image (you can use the MATLAB command `imread`) and then performs the following tasks separately:

- flips the image vertically (a.k.a. a flip)

- flips the image horizontally (a.k.a. a flop)

- inverts the image (i.e., dark colors become light and vice-versa)

- computes the horizontal and vertical gradients of the image by computing central differences (i.e., a kernel that looks like $[-1, 0, 1]$)

For each of these save out the resulting image. In your submission, please provide your code (your .m files) along with your input and output images in a single .zip or .rar file. Please use the following convention to name the zip/tar files: <Perm number>_<First name>_<Last name>_HW1