CS371 Spring 2007
Prof. Morgan McGuire

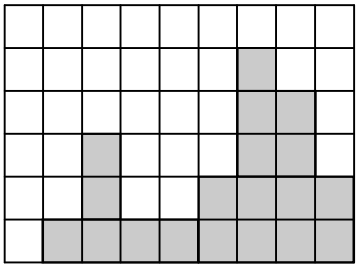
Assigned: Mon. 2/26/07
Due: Fri. 2/28/07 10:00am

Homework 3a

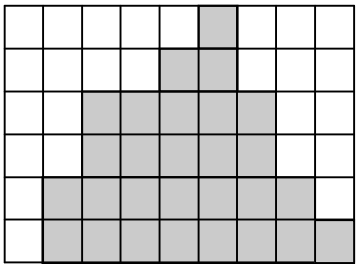
_____
Name

As with all homework in this class, work on this alone. You can use your notes, books, and the internet.

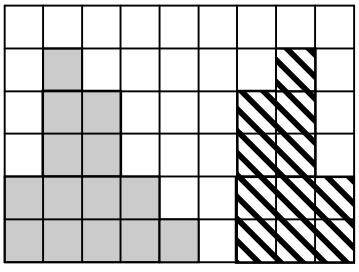
1. In the following scenario, a single source directly illuminates a surface that is observed by a human. The spectrum for the source, surface reflectivity, and two of the human's three cones are shown below on an arbitrary scale. Assume that the reflectivity spectrum already takes into account the angle of incidence, etc. What are the scalar responses (on this same arbitrary "box" scale) of Cone 1 and Cone 2?



Light source spectrum



Surface reflectivity spectrum



Cone response spectrum

Cone 1	Cone 2
Net Response:	Net Response:

2. In the retina, cones are used primarily for vision in bright environments (e.g., sunlight) and rods in dark environments (e.g., at night). Draw the spectrum of the dome light in your car that would make the interior appear maximally bright when you turn the light on to read a map yet avoid altering the adjustment of the rods that you are using to see the road. Explain your answer.

3. The code for scattering according to a Lambertian BSDF looks like:

```
r = uniformRandom (0, 1);
if (r <= p_diff.average()) {
    flux_o = flux_i * p_diff / p_diff.average();
    return true; // Scatter
} else {
   return false; // Absorb
}
```

On a separate piece of paper, write scattering code for a surface that is both Lambertian and mirror reflective. You can assume that p_spec.average() + p_diff.average() <= 1, and that a given photon is either specularly or diffusely scattered according to random chance.