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Exercise 1:
In order to do this exercise we need to use Phong Lighting Model:

$$I = I_e + \rho_a \cdot I_a + \sum_{j=1}^{n} \left(\rho_d \cdot \cos \phi_j + \rho_s \cdot \cos^k \alpha_j \right) \cdot I_j$$

where:
Ie= is equal to 0 because the materials that we are using don't have self-emitting intensity. The parameters pa, pd, ps, Ia and Ij are given to us. The most difficult part was computing the cosines and remembering that we have to normalize the vectors.
We have a few problems:

- The first was with the reflect function where we forget to put the minus sign.
- The second one was that we didn't clamp the values of the cosines that's why the values of the lights directions were wrong
- In third place while doing the for loop we weren't doing summation and we were only catching one light.

Exercise 2:

To solve this exercise we have used the following formulas:

$cos(\frac{angle}{2}) = \sqrt{\frac{1}{2} * (a + cos(angle))}$
$cos(2 * angle) = cos^2(angle) - sin^2(angle) = 2 * cos^2(angle) - 1$
$cos(angle) = cos\ (-angle)$

We started the exercise assuming that $\gamma = \frac{\beta}{2}$ is true, then, we decided to compare $cos(\gamma) = cos(\frac{\beta}{2})$. For that we used the $cos(\frac{angle}{2})$ and the $cos(2 * angle)$ formula to know the value of each cos.
At the end, we realized that they were the same because we obtained the same result from each formula.

The only problem that we have encountered has been to know what type of formulas we should use to arrive at the same results on different ways, and thus verify that $\gamma = \frac{\beta}{2}$ was true

Exercise 3:

In order to do this exercise we did research on the internet where we learned about the phenomenon called moonlight and the relationship of the angle and the distance of the moon and the sun.