

Homework #2

Due time: 2:20pm EST, Monday, Feb 13th

1. How does an image change if the aperture of the lens increases when the other factors such as the focal length is fixed? You need to give 3 types of changes. (20pts)
2. We have a square area source and a square occluder, both parallel to a plane and they vertically above one another with their centers aligned. What is the shape of the umbra if
 - (a) The source is the same size as the occluder. (10pts)
 - (b) The edge length of the source is now twice that of the occluder. (10pts)
 - (c) The edge length of the source is now half that of the occluder. (10pts)

For all three cases, what is the shape of the penumbra, respectively? (10pts)

3. Explain why it is difficult to use shadow boundaries to infer shape, particularly if the shadow is cast onto a curved surface, e.g., steps. (20pts)
4. If one looks across a large bay in the daytime, it is often hard to distinguish the mountains on the opposite side; near sunset, they are clearly visible. This phenomenon has to do with scattering of light by air—a large volume of air is actually a source. Explain what is happening. (20pts)