Lecture 18: Radiosity – Review Questions

- Explain why diffuse reflection produces a color on a surface that is independent of viewing direction.

- What is the main idea behind radiosity that takes advantage of this property?

- How do we store the results of radiosity rendering in such a way that they can be used for many camera viewpoints (e.g., as in an architectural walkthrough)?

- Why is radiosity often used in indoor architectural environments?

- The energy balance equation for radiosity is listed below. Describe the terms in this equation.

$$B_i A_i = E_i A_i + \rho_i \sum_{j=1}^{n} F_{j,i} B_j A_j$$

- Form factor symmetry gives us $F_{j,i} A_j = F_{i,j} A_i$. Explain the meaning of this equation.

- Show that form factor symmetry allows us to write the radiosity energy balance equation as:

$$B_i = E_i + \rho_i \sum_{j=1}^{n} F_{i,j} B_j$$

- What types of light sources are easiest to model for radiosity?

- Radiosity is typically solved using either a shooting or a gathering approach. Explain the key ideas behind these two approaches.

- The energy balance equation can be written in matrix form as shown below. What are the elements of the R matrix? Explain how this equation represents a gathering approach.

$$B^{k+1} = E + RB^k$$

- Why is a shooting approach typically more practical than the gathering approach? Consider as one aspect of your answer the number of form factors that must be computed for the gathering approach and for each step of the shooting approach.

- How do we avoid visible seams at edges of single-color patches used for radiosity?

- How can we get sharp shadows?

- Give some of the pros and cons of ray tracing vs. radiosity.