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CS 112

#### Written Assignment 4

1. In order to remove the artifacts you would use mipmapping. It works because the distant end of the floor is small and we don't have enough pixels to choose enough samples.
2. In Gouraud shading only illumination for the vertices is calculated. In Phong shading we calculate illumination for all pixels, meaning we have more samples in Phong shading than in Gouraud shading.
3. Skip (didn't cover in lecture)
4.
  - a. Box A: [ (2,2) , (2,6) , (6,2) , (6,6) ]  
Box B: [ (1,8) , (9,8) , (1,16) , (9,16) ]
  - b. No they never collide because the distance from the center of A to the center of B is larger than the sum of A and B's radii.
  - c. New Box B: [ (2,2) , (2,10) , (10,2) , (10,10) ]  
They are now colliding because the distance from the center of A to the center of B is smaller than the sum of A and B's radii.
5.
  - a. Torso → Left Shoulder → Left Elbow → Left Wrist → Neck → Right Shoulder → Right Elbow → Right Wrist
  - b. You would use push() and pop() to add or remove the transformation onto the OpenGL stack.
6. Skip (didn't cover in lecture)
7. You would first render 1 then 3 then 5 because you render which one is closer to the camera in opaque objects. For the translucent objects you would render 4 then 2 because you start whichever one is farther away from the camera.
8. Given  $P_0 = (0,0,0)$  and  $P_1 = (50,50,50)$

$$P = P_0 + t(P_1 - P_0)$$

$$P = (50t, 50t, 50t)$$

$$x + y + z = 200\sqrt{3}$$

$$50t + 50t + 50t = 200\sqrt{3}$$

$$150t = 200\sqrt{3}$$

$$t = \frac{200\sqrt{3}}{150} = \frac{4\sqrt{3}}{3}$$

$P = \left( \frac{200\sqrt{3}}{3}, \frac{200\sqrt{3}}{3}, \frac{200\sqrt{3}}{3} \right)$  would be the location where the ray for this pixel intersecting the two elements.