

CS 334 Final Examination

Practice Questions

1. You are given a 3-D scene modeled with triangles, and a viewpoint C. How can you find all triangles visible from C? A triangle T is visible from C if there is a point P different from C such that T is the closest surface intersected by the ray CP.
2. You are given a quad $Q_0Q_1Q_2Q_3$. You are asked to construct a planar pinhole camera that sees the quad as a square, i.e. the projection of the quad onto the camera's image plane is a square.
3. You are given a patch of a curved reflective surface S, a viewpoint E, and you are asked to approximate the reflected rays generated by E and S with a planar pinhole camera. Specify how you construct the camera, i.e. the camera's C, a, b, and c, using the notation used in class.
4. You are hired by a magician to help with an illusion. Using a projector, a camera, and a computer, you are asked to make an object on the stage disappear. You can approximate the position of the audience with a single point.
5. You are hired by Salvador Dali to simulate his famous melting clock. You have the undeformed geometric model of the clock. How can you progressively deform the model to make it look like it melts?
6. A shadow map evaluates visibility from the light at the centers of the pixels of a uniform grid; however, what is needed is to evaluate visibility at the output image pixels, whose surface point samples do not project at the shadow map pixel centers. Devise an algorithm that correctly evaluates visibility from the light at the output image samples.
7. Devise a collision algorithm that decides whether two objects modeled with triangles intersect.
8. You are hired by a sculptor who wants to construct a museum installation that looks like one object when seen from one location, and like a second object from a second location.
9. You are debugging a fragment shader that has a uniform float parameter whose value is supposed to be between 20 and 30. How can you make sure that the parameter is set correctly?
10. Devise a camera model which sees the front face and the four lateral faces of a cube. Devising a camera model means specifying the rays of the camera.