

Lecture 7: Visual realism

- (1) Fill in details of how the polygon-fill algorithm operates for the polygon with vertices $(x,y) = (23,137), (120,204), (200,100), (100,25)$, for scanlines $y=136, y=137$ and $y=138$. Specifically write the values of x_{left} and x_{right} in each case.
- (2) Design the specific data types needed to represent mesh objects in the two cases: (a) a different texture is to be applied to each face; (b) a single texture is to be wrapped around the entire mesh.
- (3) Show that it is correct to use linear (rather than hyperbolic) interpolation when finding pseudodepth. Assume point A projects to a, and B projects to b. With linear interpolation we compute pseudodepth at the projected point $\text{lerp}(a,b,f)$ as the third component of this point. This is the correct thing to do only if the resulting value equals the true pseudodepth of the point that $\text{lerp}(A,B,g)$ (for the appropriate g) projects to. Show that it is in fact correct.
- (4) Show that the ray from the source point S through vertex V hits the plane $n \cdot (P-A)=0$ and $t^* = n \cdot (A-S) / [n \cdot (V-S)]$. Show that this defines the hit point V' as given in $V' = S + (V-S)n \cdot (A-S) / [n \cdot (V-S)]$.
- (5) Suppose a cube is floating above a plane. What is the shape of the cube's shadow if the point source lies (a) directly above the top face? (b) along a main diagonal of the cube? Sketch shadows for a sphere and for a cylinder floating above a plane for various source positions.