Projection Review with…
A Hack: Painted Shadows

- Use projection to squash objects onto floor
- Paint a copy of them in black on the floor
- Useful for UI

- Drop Straight onto floor = set Y to zero

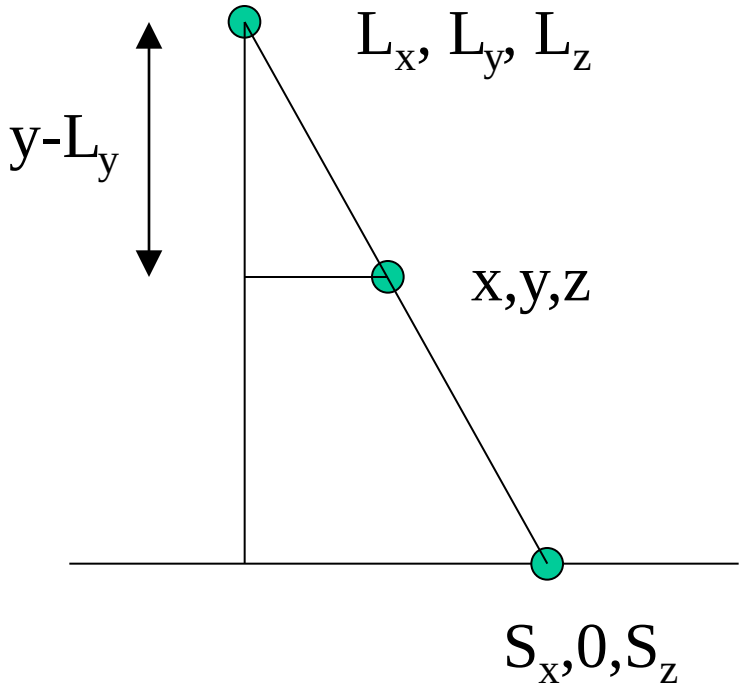
$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

- Beware – might want to have things float above floor

- Stencil buffer tricks

Projective Shadows – point light

- Position of light L_x, L_y, L_z
- Position of point x,y,z
- Position of Shadow S_x,0, S_z
  - Assume ground (y) = 0



$$\frac{x - l_x}{l_y - y} = \frac{S_x - l_x}{l_y - 0}$$

$$S_x - l_x = l_y \frac{x - l_x}{l_y - y}$$

$$S_x = \frac{l_y (x - l_x)}{l_y - y} + l_x \frac{(l_y - y)}{(l_y - y)}$$

$$S_x = \frac{l_y x - l_x l_y}{l_y - y} + \frac{l_y l_x - l_x y}{l_y - y}$$

$$S_x = \frac{l_y x}{l_y - y} + \frac{-l_x y}{l_y - y} + \frac{l_x l_y - l_x l_y}{l_y - y}$$

$$\begin{bmatrix} l_y & -l_x & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & -l_z & l_y & 0 \\ 0 & -1 & 0 & l_y \end{bmatrix}$$

← zero out Y