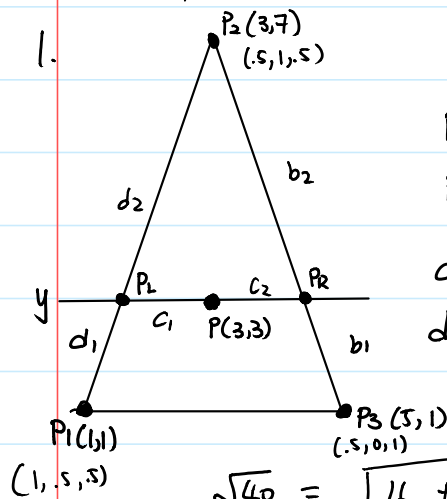


Written Homework #4

Thursday, March 31, 2016

11:14 PM

Interpolation



$$P = \frac{c_2}{c_1 + c_2} \cdot P_L + \frac{c_1}{c_1 + c_2} P_R$$

$$P_L = \frac{d_2}{d_1 + d_2} P_1 + \frac{d_1}{d_1 + d_2} P_2$$

$$P_R = \frac{b_2}{b_1 + b_2} P_3 + \frac{b_1}{b_1 + b_2} P_2$$

$$\text{dist } d = \sqrt{(7-1)^2 + (3-5)^2} = \sqrt{36 + 4} = \sqrt{40}$$

$$\text{dist } b = \sqrt{(7-1)^2 + (3-5)^2} = \sqrt{36 + 4} = \sqrt{40}$$

$$\sqrt{40} = \sqrt{16 + (3-L)^2} + \sqrt{4 + (L-1)^2} \quad L = \frac{5}{3}$$

$$\sqrt{40} = \sqrt{16 + (3-R)^2} + \sqrt{4 + (R-5)^2} \quad R = \frac{13}{3}$$

$$P_L = \left(\frac{5}{3}, 3\right)$$

$$P_R = \left(\frac{13}{3}, 3\right)$$

$$c_1 = \sqrt{(3-3)^2 + \left(\frac{4}{3} - \frac{5}{3}\right)^2} = \frac{4}{3}$$

$$c_1 + c_2 = \frac{8}{3}$$

$$c_2 = \sqrt{(3-3)^2 + \left(\frac{4}{3} - \frac{13}{3}\right)^2} = \frac{4}{3}$$

$$d_1 = \sqrt{(3-1)^2 + \left(\frac{5}{3} - 1\right)^2} = \frac{2\sqrt{10}}{3}$$

$$d_1 + d_2 = \frac{6\sqrt{10}}{3} = \frac{2\sqrt{10}}{1}$$

$$d_2 = \sqrt{(7-3)^2 + \left(3 - \frac{5}{3}\right)^2} = \frac{4\sqrt{10}}{3}$$

$$b_1 = \sqrt{(3-1)^2 + \left(\frac{13}{3} - 5\right)^2} = \frac{2\sqrt{10}}{3}$$

$$b_1 + b_2 = \frac{6\sqrt{10}}{3} = \frac{2\sqrt{10}}{1}$$

$$b_2 = \sqrt{(7-3)^2 + \left(3 - \frac{13}{3}\right)^2} = \frac{4\sqrt{10}}{3}$$

$$\frac{d_1}{d_1 + d_2} = \frac{1}{3}$$

$$@P_L \quad \frac{2}{3} \left(1, \frac{1}{2}, \frac{1}{2}\right) + \frac{1}{3} \left(\frac{1}{2}, 1, \frac{1}{2}\right) = \left(\frac{4}{6}, \frac{2}{6}, \frac{2}{6}\right) + \left(\frac{1}{6}, \frac{2}{6}, \frac{1}{6}\right) = \left(\frac{5}{6}, \frac{4}{6}, \frac{3}{6}\right)$$

$$\frac{d_2}{d_1 + d_2} = \frac{2}{3}$$

$$@P_R \quad \frac{2}{3} \left(\frac{1}{2}, 0, 1\right) + \frac{1}{3} \left(\frac{1}{2}, 1, \frac{1}{2}\right) = \left(\frac{2}{6}, 0, \frac{4}{6}\right) + \left(\frac{1}{6}, \frac{2}{6}, \frac{1}{6}\right) = \left(\frac{3}{6}, \frac{2}{6}, \frac{5}{6}\right)$$

$$\frac{b_1}{b_1 + b_2} = \frac{1}{3}$$

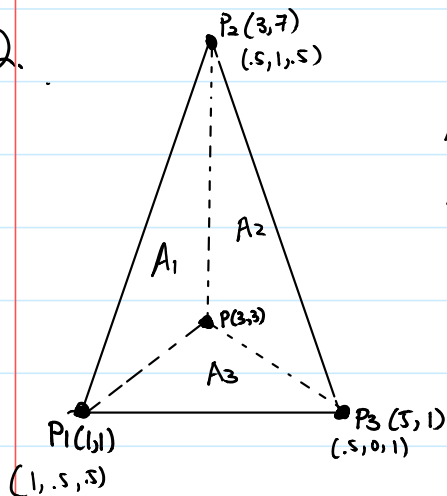
$$@P \quad \frac{1}{2} \left(\frac{5}{6}, \frac{4}{6}, \frac{3}{6}\right) + \frac{1}{2} \left(\frac{3}{6}, \frac{2}{6}, \frac{5}{6}\right) = \left(\frac{5}{12}, \frac{4}{12}, \frac{3}{12}\right) + \left(\frac{3}{12}, \frac{2}{12}, \frac{5}{12}\right)$$

$$\frac{b_2}{b_1 + b_2} = \frac{2}{3}$$

$$(r, g, b) = \left(\frac{8}{12}, \frac{6}{12}, \frac{8}{12}\right) = (.66, .5, .66)$$

$$\approx (0.67, 0.5, 0.67)$$

2.



$$A = \frac{1}{2} (4)(6) = 12$$

$$A_1 + A_2 + A_3 = A$$

$$A_1 = A_2 \quad A_3 = \frac{1}{2} (4)(2) = 4$$

$$2A_1 + A_3 = 12$$

$$2A_1 + 4 = 12 \quad 2A_1 = 8$$

$$A_1 = A_2 = 4$$

$$\alpha = A_1/A = 4/12 = \frac{1}{3}$$

$$\beta = A_2/A = 4/12 = \frac{1}{3}$$

$$\gamma = A_3/A = 4/12 = \frac{1}{3}$$

$$P_{rgb} = \alpha P_{1rgb} + \beta P_{2rgb} + \gamma P_{3rgb}$$

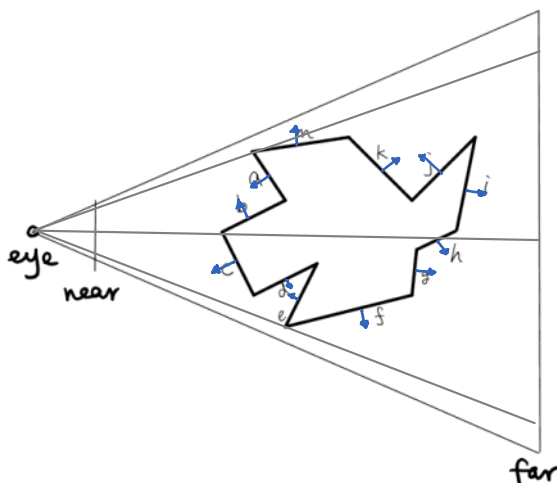
$$= \frac{1}{3} (1, 5, 5) + \frac{1}{3} (-5, 1, 5) + \frac{1}{3} (.5, 0, 1)$$

$$= \left(\frac{2}{6} + \frac{1}{6} + \frac{1}{6}, \frac{1}{6} + \frac{2}{6} + 0, \frac{1}{6} + \frac{1}{6} + \frac{2}{6} \right)$$

$$= \left(\frac{4}{6}, \frac{3}{6}, \frac{4}{6} \right)$$

$$P_{rgb} = (0.67, 0.5, 0.67)$$

3.



these faces would be culled:

While the backface culling

doesn't resolve the hidden

surface problems.

backface culling were used

4. a) Plane Z-val

4. a)

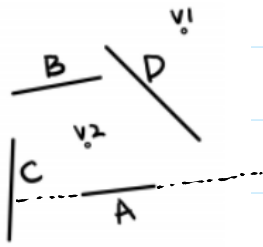
<u>Plane</u>	<u>Z-val</u>	
near	0.000	
bin 0 and 1	0.125	$\frac{1}{8} = 0.125$
bin 1 and 2	0.250	
bin 2 and 3	0.375	
bin 3 and 4	0.500	
bin 4 and 5	0.625	
bin 5 and 6	0.750	
bin 6 and 7	0.875	
far	1.000	

b)

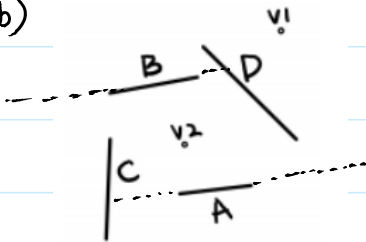
<u>Plane</u>	<u>Z-val</u>
near	0.1
bin 0 and 1	
bin 1 and 2	
bin 2 and 3	
bin 3 and 4	
bin 4 and 5	
bin 5 and 6	
bin 6 and 7	
far	80

c). This graphic card might be very bad in terms of depth test, because

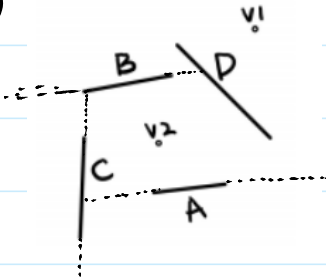
5. a)



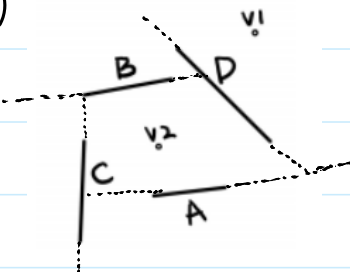
b)



c)



d)



e) eye point v_1
node (root) A: