CSE-4303 CSE5365 Computer Graphics
Practice Perspective Projections

The viewing parameters for the perspective projection are given as

VRP(WC)=(1,2,3) VPN(WC)=(3,4,5)

VUP(WC)=(3,6,4) PRP (VRC)=(2,5,4)

u_{min} (VRC) = 7 u_{max} (VRC) = 11

v_{min} (VRC) = -1 v_{max} (VRC) = 1

n_{min} (VRC) = 6 n_{max} (VRC) = 9

Given all other transformations, find the **Scale** matrix which will transform this viewing volume into a standard perspective volume x=z, x=-z, y=z, y=-z, z=zmin, z=1

Matrix #2: Rx

1.000	0.000	0.000	0.000
0.000	0.781	-0.625	0.000
0.000	0.625	0.781	0.000
0.000	0.000	0.000	1.000

Matrix #1: Translate

1.000	0.000	0.000	-1.000
0.000	1.000	0.000	-2.000
0.000	0.000	1.000	-3.000
0.000	0.000	0.000	1.000

Matrix #4: Rz

0.996	0.091	0.000	0.000
-0.091	0.996	0.000	0.000
0.000	0.000	1.000	0.000
0.000	0.000	0.000	1.000

Matrix #3: Ry

0.906	0.000	-0.424	0.000
0.000	1.000	0.000	0.000
0.424	0.000	0.906	0.000
0.000	0.000	0.000	1.000

Matrix #6: Shear

1.000	0.000	1.750	0.000
0.000	1.000	-1.250	0.000
0.000	0.000	1.000	0.000
0.000	0.000	0.000	1.000

Matrix #5: Translate

1.000	0.000	0.000	-2.000
0.000	1.000	0.000	-5.000
0.000	0.000	1.000	-4.000
0.000	0.000	0.000	1.000

Matrix #8: Scale

Matrix #7: scale

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The viewing parameters for the perspective projection are given as

VRP(WC)=(3,4,5) VPN(WC)=(8,6,12)

VUP(WC)=(1,2,3) PRP (VRC)=(2,5,5)

u_{min} (VRC) = 6 u_{max} (VRC) = 11

v_{min} (VRC) = -3 v_{max} (VRC) = 5

n_{min} (VRC) = 6 n_{max} (VRC) = 10

Given all other transformations, find the **Scale** matrices which will transform this viewing volume into a standard perspective volume

Matrix #2: Rx

1.000	0.000	0.000	0.000
0.000	0.894	-0.447	0.000
0.000	0.447	0.894	0.000
0.000	0.000	0.000	1.000

Matrix #1: Translate

1.000	0.000	0.000	-3.000
0.000	1.000	0.000	-4.000
0.000	0.000	1.000	-5.000
0.000	0.000	0.000	1.000

Matrix #4: Rz

0.417	0.909	0.000	0.000
-0.909	0.417	0.000	0.000
0.000	0.000	1.000	0.000
0.000	0.000	0.000	1.000

Matrix #3: Ry

0.859	0.000	-0.512	0.000
0.000	1.000	0.000	0.000
0.512	0.000	0.859	0.000
0.000	0.000	0.000	1.000

Matrix #6: Shear

1.000	0.000	1.300	0.000
0.000	1.000	-0.800	0.000
0.000	0.000	1.000	0.000
0.000	0.000	0.000	1.000

Matrix #5: Translate

1.000	0.000	0.000	-2.000
0.000	1.000	0.000	-5.000
0.000	0.000	1.000	-5.000
0.000	0.000	0.000	1.000

Matrix #8: Scale

Matrix #7: scale

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1. The viewing parameters for a perspective projection are given as

   VRP(WC)=(2,6,3) VPN(WC)=(6,0,0)
   VUP(WC)=(0,3,4) PRP (VRC)=(3,6,-10)
   u_{min} (VRC) = 1 u_{max} (VRC) = 11
   v_{min} (VRC) = -1 v_{max} (VRC) = 3
   n_{min} (VRC) = 10 n_{max} (VRC) = 40

   a. Find the sequence of transformations which will transform this viewing volume into a standard perspective view volume which is bounded by the planes: x=z ; x=-z ; y=z ; y=-z ; z=1 (Complete the blank matrices)
   b. Find the zmin after all transformations are done.

Matrix #2: Rx

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

Matrix #1: Translate

1	0	0	-2
0	1	0	-6
0	0	1	-3
0	0	0	1

Matrix #4: Rz

Matrix #3: Ry

Matrix #6 Shear

Matrix #5: Translate

1	0	0	-3
0	1	0	-6
0	0	1	10
0	0	0	1

Matrix #8 Scale

Matrix #7 Scale

Zmin=

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The viewing parameters for a perspective projection are given as:

VRP(WC)=(**0,0,0**)   VPN(WC)=(**0, 0,1**)
VUP(WC)=(**0,1,0**)   PRP (VRC)=(**4,6,8**)

u_{min} (VRC) = **-4** u_{max} (VRC) = **4**
v_{min} (VRC) = **-5** v_{max} (VRC) = **5**
n_{min} (VRC) = **12** n_{max} (VRC) = **18**

Find the sequence of transformations which will transform this viewing volume into a unit cube which is bounded by the planes: x=z ; x=-z ; y=z ; y=-z ; z=zmin ; z=1

c. Find the **Translation matrix** (Matrix #5)
d. Find the **Shear matrix** (Matrix #6)
e. Find the **scale matrices** (Matrix #7 and Matrix #8).
f. Find the **zmin** after all transformations are done.

Matrix #2: Rx

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

Matrix #1: Translate

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

Matrix #4: Rz

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

Matrix #3: Ry

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

Matrix #6: Shear

Matrix #5: Translate

Matrix #8: Scale

Matrix #7: Scale

Zmin=

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The viewing parameters for a perspective projection are given as

VRP(WC)=(0,0,0) VPN(WC)=(0, 0,1)

VUP(WC)=(0,1,0) PRP (VRC)=(4,7,10)

u_{min} (VRC) = 6 u_{max} (VRC) = 11

v_{min} (VRC) = -3 v_{max} (VRC) = 5

n_{min} (VRC) = 12 n_{max} (VRC) = 20

Given all other transformations, find the **shear** matrix which will transform this viewing volume into a standard perspective view volume which is bounded by the planes: x=z ; x=-z ; y=z ; y=-z ; z=1

Matrix #2: Rx

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

Matrix #1: Translate

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

Matrix #4: Rz

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

Matrix #3: Ry

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

Matrix #6: Shear

Matrix #5: Translate

1	0	0	-4
0	1	0	-7
0	0	1	-10
0	0	0	1

Matrix #8: Scale

0.1	0	0	0
0	0.1	0	0
0	0	0.1	0
0	0	0	1

Matrix #7: Scale

4.0	0	0	0
0	2.5	0	0
0	0	1	0
0	0	0	1

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2. The viewing parameters for a perspective projection are given as
   VRP(WC)=(**0,0,0**) VPN(WC)=(**0, 0,1**)
   VUP(WC)=(**0,1,0**) PRP (VRC)=(**5,12,-5**)

   u_{min} (VRC) = **-9** u_{max} (VRC) = **11**
   v_{min} (VRC) = **-19** v_{max} (VRC) = **-15**
   n_{min} (VRC) = **-3.5** n_{max} (VRC) = **-1**

Find the sequence of transformations which will transform this viewing volume into a standard perspective view volume which is bounded by the planes: x=z ; x=-z ; y=z ; y=-z ; z=1 ; z=zmin

g. Find the **Shear matrix** (Matrix #6)
h. Find the **scale matrices** (Matrix #7 and Matrix #8).
i. Find the **zmin** after all transformations are done.

Matrix #2: Rx

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

Matrix #1: Translate

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

Matrix #4: Rz

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

Matrix #3: Ry

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

Matrix #6: Shear

Matrix #5: Translate

1	0	0	-5
0	1	0	-12
0	0	1	5
0	0	0	1

Scale2

Scale1

Zmin=

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The viewing parameters for a perspective projection are given as

VRP(WC)=(**0,0,0**) VPN(WC)=(**0, 1,0**)

VUP(WC)=(**1,0,0**) PRP (VRC)=(**-2,6,-30**)

u_{min} (VRC) = **8** u_{max} (VRC) = **18**

v_{min} (VRC) = **-9** v_{max} (VRC) = **6**

n_{min} (VRC) = **-27** n_{max} (VRC) = **-26**

Find the sequence of transformations which will transform this viewing volume into a standard perspective view volume which is bounded by the planes: x=z ; x=-z ; y=z ; y=-z ; z=1 ; z=zmin

j. Find the **sequence of matrices**
k. Find the **zmin** after all transformations are done.

Matrix #2: Rx

Matrix #1: Translate

1	0	0	0
0	1	0	0
0	0	1	0
0	0	0	1

Matrix #4: Rz

Matrix #3: Ry

Matrix #6: Shear

Matrix #5: Translate

Scale2

Scale1

Zmin=

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The viewing parameters for a perspective projection are given as

VRP(WC)=(0,0,0) **VPN(WC)=(0, 0,2)**
VUP(WC)=(0,1,4) **PRP (VRC)=(10,20,25)**
u_{min} (VRC) = 3 **u_{max} (VRC) = 11**
v_{min} (VRC) = 6 **v_{max} (VRC) = 26**
n_{min} (VRC) = 27 **n_{max} (VRC) = 30**

Find the sequence of transformations which will transform this viewing volume into a standard perspective view volume which is bounded by the planes: x=z ; x=-z ; y=z ; y=-z ; z=1

Show the matrices for Problem 1

Matrix #2

Matrix #1

Matrix #4

Matrix #3

Matrix #6

Matrix #5

Matrix #8

Matrix #7
