

Final Exam

- Due No due date
- Points 100
- Questions 32
- Available May 13 at 1:15pm - May 13 at 3:15pm 2 hours
- Time Limit 120 Minutes

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	47 minutes	77.5 out of 100

❗ Correct answers will be available on May 13 at 3:30pm.

Score for this quiz: 77.5 out of 100

Submitted May 13 at 2:01pm

This attempt took 47 minutes.



Question 1

3 / 3 pts

Bezier Curve of Degree 5 given by

- ☐ $(1-t)^4p_0 + 5t(1-t)^3p_1 + 10t^2(1-t)^3p_2 + 10t^3(1-t)^2p_3 + 5t^4(1-t)p_4 + t^4p_4$
- ☒ $(1-t)^5p_0 + 5t(1-t)^4p_1 + 10t^2(1-t)^3p_2 + 10t^3(1-t)^2p_3 + 5t^4(1-t)p_4 + t^5p_5$
- ☐ $(1-t)^5p_0 + 5t(1-t)^4p_1 + 10t^3(1-t)^2p_2 + 10t^2(1-t)^3p_3 + 5t^4(1-t)p_4 + t^5p_5$
- ☐ $(1-t)^5p_5 + 5t(1-t)^4p_4 + 10t^2(1-t)^3p_3 + 10t^3(1-t)^2p_2 + 5t^4(1-t)p_1 + t^5p_0$



Question 2

3 / 3 pts

The Binomial Coefficients of degree 7 Bezier curve given as

- ☐ 1 5 10 10 5 1
- ☐ 1 21 20 35 20 21 1
- ☐ 1 6 15 20 15 6 1
- ☒ 1 7 21 35 35 21 7 1



IncorrectQuestion 3

0 / 4 pts

if an equation given as

$(-t^4+2t^3+t^1)p_0 + 5(t^4-t^2)p_1 + (t^2-t^1+2)p_2 + (1-t)p_3 + (t^4)p_4$: the 3rd row of the matrix M given as (Note: Row 1 indexed as 1)

$$[P_0 \ P_1 \ P_2 \ P_3 \ P_4] M [t^4 \ t^3 \ t^2 \ t \ 1]^T$$

☐ 1 -1 -1 -1 0

☐ 0 0 1 -1 2

☒ 0 0 0 -1 -1

☐ 1 0 0 0 0



IncorrectQuestion 4

0 / 5 pts

Find the equation of line passing (2,-1,5) and (4,8,0)

☒ $x = 2+2t, y = -1+9t, z = 5+5t$

☐ $x = 2(1+t), y = (-1+9t), z = 5(1-t)$

☐ $x = 2+4t, y = -1+8t, z = 5$

☐ $x = 2-t, y = -1-9t, z = 5+5t$



Question 5

3 / 3 pts

Given Matrix X and Y

$$X = \begin{bmatrix} 3 & 5 & 2 \\ 7 & 6 & 8 \\ 5 & 1 & 3 \end{bmatrix}$$

$$Y = \begin{bmatrix} 2 & 6 & 3 \\ 9 & 3 & 8 \\ 5 & 0 & 0 \end{bmatrix}$$

Diagonal values of resulting matrix of $X \times Y$ is (Note: diagonal is top left most to bottom right most column)

- ☒ 61 60 23
- ☐ 29 23 0
- ☐ 29 23 17
- ☐ 61 39 65



Question 6

3 / 3 pts

Construct a matrix sequence for a triangle that rotates around the y - axis

- Through $\theta = 30$ degrees counter clockwise about its point $B = (1 \ 0 \ -1)$
- Let $C = \cos(30^\circ)$, $S = \sin(30^\circ)$.

What is the diagonal values 4×4 Matrix after multiplying first 2 Matrices.

(Note : First is left most matrix and diagonal is top left most to bottom right most ...)

- ☐ C 1 S 1
- ☒ C 1 C 1
- ☐ C 1 C -1
- ☐ C 1 C 3



Question 7

3 / 3 pts

Construct a matrix sequence for a triangle that rotates around the y - axis

- Through $\theta = 30$ degrees counter clockwise about its point $B = (1 \ 0 \ -1)$
- Let $C = \cos(30^\circ)$, $S = \sin(30^\circ)$.

If Triangle repeat the rotation for 3 times what is the value of B?

- ☐ 1 0 1
- ☒ (1 0 -1)
- ☐ 0, 0, -1
- ☐ -1 0 -1



IncorrectQuestion 8

0 / 3 pts

Consider the Given WaveFront model

```
v -67.88 56.95 17.50
v -87.78 59.63 11.98
v -165.98 132.04 124.09
v 44.16 63.88 79.08
```

```
vt 0.71 0.81
vt 0.67 0.82
vt 0.81 0.82
vt 0.82 0.82
vt 0.69 0.82
```

```
vn -1.0 0.0 0.0
vn 0.5 0.0 -1.0
vn 1.0 0.6 0.0
vn 0.0 0.0 1.0
```

output of f 1/1/3, 2/2/1, 1/3/3 (order of v, vt, vn)



-67.88 56.95 17.50 / 0.71 0.81/0.00 0.00 1.00, -87.78 59.63 11.98/0.67 0.82/-1.0 0.0 0.0 , -165.98 132.04 124.09/0.81 0.82/1.0 0.6 0.0



-87.78 59.63 11.98/0.67 0.82/0.0 0.0 1.0, -165.98 132.04 124.09/0.81 0.82/0.5 0.0 -1.0, -87.78 59.63 11.98/0.82 0.82/0.0 0.0 1.0



-67.88 56.95 17.50/0.71 0.81/1.0 0.6 0.0, -87.78 59.63 11.98/0.67 0.82/-1.0 0.0 0.0, -67.88 56.95 17.50/0.81 0.82/1.0 0.6 0.0

☐ None of the answers


IncorrectQuestion 9

0 / 3 pts

True Statements about Normal Mapping

- ☐ Technique uses RGB color to represent normal
- ☒ Normal mapping works with per fragment normal using textures
- ☒ Normal maps can show angles like Bump Maps
- ☐ Bump Maps are advanced than Normal Maps uses in 3D graphics



Question 10

3 / 3 pts

Which of the following is true about shader rendering?

- ☐ Fragment Shader comes before Vertex Shader
- ☒ Fragment Shader comes after Vertex Shader
- ☐ Fragment shader and Vertex Shader comes at same time
- ☐ Both shaders process before Rasterization



Question 11

3 / 3 pts

One way to pass variables between shaders?

- ☐ Using uniform variable type
- ☒ Using varying variable type
- ☐ Using Attribute variable type
- ☐ shaders cannot pass variables each other



Question 12

3 / 3 pts

Match test operations

Scissor test

Restrict drawing of some po ▼

Alpha test

Accept or reject fragments ▼

stencil test

Restrict drawing of some po ▼

Accumulation Buffer

uses for depth fields and mc ▼



PartialQuestion 13

1.5 / 3 pts

True statements relate to buffers

- ☒ The accumulation buffer used for accumulating a series of images into a final, composite image

- ☐ Depth Buffer only uses for shadow mapping
- ☐ Contains only Color Index or only RGB color data
- ☐ Stencil buffer facilitates masking



Question 14

3 / 3 pts

Which would give an compile error in shader

```
vec3 alpha = vec3(1.0, 2.0, 3.0);
```

```
vec4 a;
```

- ☐ a.x= alpha.y
- ☐ All of the statements
- ☐ a=(alpha, 2.0)
- ☒ a= alpha.rgba



Question 15

3 / 3 pts

What is NOT the main purpose of the Vertex Buffer Object

- ☐ None of these
- ☒ Vertex Buffer Object mainly handles pixel data
- ☐ VBO uses to connect the vertex data to the vertex shader
- ☐ VBO uses to control over the vertex shader data



Question 16

3 / 3 pts

Which of the statement are true?

- ☒ Accumulation Buffer is a combination of VBO, VAO and PBO
- ☒ VAO handles one or more Vertex Buffer Objects
- ☒ EBO helps to organize elements
- ☒ PBO mostly used to store texture data



Question 17

3 / 3 pts

Which is true about Graphic pipeline?

- ☐ Pixel Shading handles in Geometry stage
- ☐ All of the statements
- ☐ Screen mapping and vertex shading is part of Rasterization stage
- ☒ There are three main stages : Application, Geometry , Rasterizer



Question 18

3 / 3 pts

A 3D model translate to the center and performing a rotation known as

- ☒ Affine Transformation
- ☐ Rotation
- ☐ Center Mapping
- ☐ Translation



Question 19

4 / 4 pts

Find p' after translate point $p = (10, 20, 30)$ by $t = [5, -6, 3]^T$

- ☐ $p' = (50, -60, 90)$
- ☒ $p' = (15, 14, 33)$
- ☐ $p' = (15, 26, 27)$
- ☐ $p' = (5, 14, 27)$



Incorrect Question 20

0 / 3 pts

Find the Inverse matrix of R where the R is a 30 degree 4 x 4 Rotation matrix that rotates around y axis in clockwise direction

☐

$$\begin{bmatrix} 0.87 & 0 & 0.5 & 0 \\ 0 & 1 & 0 & 0 \\ -0.5 & 0 & 0.87 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

☐

$$\begin{bmatrix} -0.87 & 0 & -0.5 & 0 \\ 0 & 1 & 0 & 0 \\ 0.5 & 0 & -0.87 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

None of these



☐

$$\begin{bmatrix} \cos(30) & 0 & -0.5 & 0 \\ 0 & 1 & 0 & 0 \\ 0.5 & 0 & \cos(30) & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$



Question 21

3 / 3 pts

Set camera at +10 on z Axis

Center at (0,0,0)

up at Oz axis (0,0,1)

Consider $v' = P \times V \times M \times v$ product of matrixes

Find the sum of diagonal values of View Matrix (Note: diagonal -> top left to bottom right)

- ☐ 11
☐ 1
☒ 2
☐ Not any of these



Question 22

3 / 3 pts

If right = 3, left = 1, top = 5, bottom = 3, near = 12, far = 10

Sum of values in the right most column of a Orthographic Projection Matrix give by

- ☐ 5
☐ -6
☒ 6
☐ -16



Question 23

3 / 3 pts

eye at (0, 0, 1), Center at (0,0,0), up at Oy axis (0,1,0)

If right = 3, left = 1, top = 5, bottom = 3, near = 12, far = 10

Product of Orthographic Projection Matrix and View Matrix given by

☒

$$\begin{bmatrix} 0 & 0 & 1 & -2 \\ 0 & 0 & 0 & -4 \\ 0 & 1 & 0 & 11 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

- ☐ Not any of these

☐
$$\begin{bmatrix} 1 & 0 & 1 & -2 \\ 0 & 1 & 0 & -4 \\ 0 & 1 & 1 & -9 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

☐
$$\begin{bmatrix} 1 & 0 & 1 & -2 \\ 0 & 0 & 0 & -4 \\ 0 & 1 & 1 & 9 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$



Question 24

3 / 3 pts

What is true about Skeletal Animations

- ☒ Skeletal animation requires a fewer image and less memory.
- ☐ Bone space is same as Model space since bones are inside the model
- ☐ Bone units can be completely independent
- ☐ Can perform without a timer



Question 25

3 / 3 pts

Find the intersection point of a line and a plain

where plain $2x + 2y + 5z - 2 = 0$ and line move from $(0,0,0)$ to $(2, 3, 1)$

- ☐ $t = 3/10$
- ☐ Not any of these
- ☐ $-1 \cdot (0.6, 0.9, 0.3)$
- ☒ $(4/15, 6/15, 2/15)$



Question 26

3 / 3 pts

What is true about Barycentric coordinates on a triangle

If $\beta = 0$ means P is on Edge



Point in a triangle can be define as $P = a + \beta(b-a) + \lambda(c-a)$



α, β, λ are zero means P is in center



☒ Can use to determine a given point locate inside a triangle



IncorrectQuestion 27

0 / 3 pts

What is true about Model View Projection Matrix Modes

- ☐ Sometimes Model Coordinates can fit into world coordinates without conversion
- ☒ Projection Matrix * View Matrix * Verticies * Model Matrix gives the final Out look
- ☐ glOrtho () and glFrustum() gives the same outlook after rendering
- ☐ Translation handles in View Matrix



Question 28

3 / 3 pts

What is true about Model View Projection Matrix

- ☐ Model Matrix * View Matrix * Projection Matrix + Model Coordinates
- ☐ Model Coordinates * Model Matrix * View Matrix * Projection Matrix
- ☒ Projection Matrix * View Matrix * Model Matrix * Model Coordinates
- ☐ View Matrix * Model Matrix * Projection Matrix * Model Coordinates



Question 29

3 / 3 pts

Matrix Multiply

$$\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 6 & 0 & 1 & 1 \\ 2 & 2 & 3 & 1 \\ 1 & 2 & 1 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 & -2 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & -1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

☒
$$\begin{bmatrix} 6 & 0 & 1 & -10 \\ 2 & 2 & 3 & -7 \\ 1 & 2 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

☐
$$\begin{bmatrix} 6 & 0 & 1 & -10 \\ 2 & 2 & 3 & -7 \\ 1 & 2 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

☐
$$\begin{bmatrix} 6 & 0 & 1 & 14 \\ 2 & 2 & 3 & 10 \\ 1 & 2 & 1 & 9 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

☐ None of these



Question 30

3 / 3 pts

Find the determinant of

$$\begin{bmatrix} 1 & 2 & 4 \\ 5 & 0 & 7 \\ 2 & 0 & 0 \end{bmatrix}$$

☒ None of these

☐ -28

☐ 0

☐ 29



Question 31

3 / 3 pts

The sum of diagonals of a composite Matrix that rotates a triangle in the 2d plane through angle Θ on clockwise direction about it's point $c = (-5, -5)$ and scale by 3 keeping point $(0, 0)$ unchanged given by:

Let $\cos = C$ and $\sin = S$

(Note: diagonal is top left most to bottom right most column)

☐ $6S+3$

☐ $3S+1$

☒ $6C+1$

☐ $6C + S$



Question 32

3 / 3 pts

If $A = (3, 1, 1)$ $B = (4, 4, 3)$ and $C = (6, 8, 4)$

Find the surface normal for the ABC triangle in clockwise order

☐ $[5 \ 3 \ 2]^T$

☒ $[5 \ -3 \ 2]^T$

☐ $[-5 \ 3 \ 2]^T$

☐ $[-5 \ 3 \ -2]^T$

Quiz Score: 77.5 out of 100